ROCKS and MINERALS
PUBLISHED MONTHLY

Edited and Published by
PETER ZODAC

SEPT. - OCT.
1948

Contents for September-October, 1948

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ROCKS and MINERALS - PEEKSKILL, N. Y., U. S. A.

The official Journal of the Rocks and Minerals Association

CHIPS FROM THE QUARRY

PALACHE'S FAMOUS REPORT AGAIN AVAILABLE

One of the most famous reports ever issued for the mineral collector is:

Professional Paper 180. The minerals of Franklin and Sterling Hill, Sussex County, N. J., by Charles Palache. 1935 [1948]. vi, 135 pp., 19 pls., 199 figs. For sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Price, 75 cents.

This very popular report was prepared by America's most distinguished mineralogist, Prof. Charles Palache, of Harvard University. It describes all minerals known, up to 1935, from the famous zinc mines while the many plates of minerals are unusually good. For some time the report was unobtainable as the supply quickly became exhausted but now it is available again as a new supply has been reprinted by the Government Printing Office.

All collectors interested in Franklin, N. J., minerals should get a copy NOW, while the supply lasts, as it may never be reprinted again. Its price is only 75 cents.

Rocks and Minerals Now A Bi-Monthly

With this issue *Rocks and Minerals* makes its first appearance as a bi-monthly (out once every two months). This step is necessary due to the present unsettled conditions in the printing industry. Once conditions become normal, the magazine will revert back to a monthly.

We deeply appreciate the many letters of commendations received from subscribers. A typical one is printed below.

"I like your bi-monthly idea. It should make for a bigger, and if possible, better issues."

Richmond E. Myers,
Dept. of Geology
Muhlenberg College,
Allentown, Penn.

Aug. 21, 1948

Geological Society of America Annual Meeting.

The sixty-first annual meeting of the Geological Society of America is to be held in New York City on November 11-12-13, at the Hotel Pennsylvania.

In connection with the meeting, twelve field excursions have been planned, dealing with various phases of geology and mineralogy.

All sessions are open to the public.

COMING EVENTS

Mineralogical Club of Hartford

OUTINGS FOR 1948

Sept. 26—Chester, Mass.
Blanford, Mass.
Oct. 10—Roxbury, Conn.
Oct. 24—Lincoln, R. I.
Nov. 14—Open Date

Meeting Place—249 High Street, Hartford, Conn.
Time—9:00 A.M., on the dot.

Anyone needing transportation or can take some one, please call one of the following committee:

		Tele. No.
George P. Robinson	Hartford,	7-9670
Arthur T. Safford	Hartford,	3-0341
Robt. Brandenburger	Hartford,	5-3365
George Dunbar	Hartford,	54-4887

San Diego Mineral & Gem Society's
11th Annual Show
Oct. 16-17, 1948
(Saturday 10 to 10—Sunday 10 to 6)
Federal Bldg., Balboa Park, San Diego, California.
Show headquarters, 4010 Alameda Drive, San Diego 3, California.

Editor Made Honorary Member of California Society

Peter Zodac, Editor of *Rocks and Minerals,* has been made an honorary member of the Feather River Gem & Mineral Society, of Oroville, California. This is an honor that is gratefully appreciated by the Editor.

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RAMBLES IN A COLLECTOR'S PARADISE
Part 4

By HORACE W. SLOCUM
320 Charlotte Ave., Rock Hill, S. C.

PIERREPONT AND WHAT HAPPENED THERE.

Will Rodgers said, "I only know what I read in the papers." I can repeat it after him like this—I only know what I read in *Rocks and Minerals*. *Rocks and Minerals* tells us that some searched and found the famous black tourmaline locality in Pierrepont, N. Y., and some enquired and could get no directions. I was more fortunate than the latter. For I received directions but had to search even then before I found the crystals. In more ways than this, too, was I fortunate. My first visit was made on May 22, 1938. The second on July 23rd of the same year. What had happened to the place between those two dates shouldn't happen to any location. I had a suspicion as well as a sinking feeling when, on the second visit, the lady at the farm house where I leave my car, told me that shortly after I first came, some 23 persons descended on them, and said 23 persons went over into the pasture and dug. Note that word "dug". "Plowed", would be much more appropriate. For that 20 foot depression in the ground, ringed round with pieces of the former boulder had been overturned, scattered and pulled to pieces, so that I wondered if it would be any use at all for me to dig there now.

But let us take first things first and return to our initial visit. I had Agar's notes as well as a topographical map. The map was an early issue and showed to my confusion a road that was now abandoned. Agar's notes referred to the same road. How was I to know that it was, at the time, an unused cart track? This being the case, unable to interpret the notes and the map, there being only one thing to do. Enquire. Fortunately I reached the right person. The town clerk. He gave me directions, which when followed brought me into the pasture beside Leonard Brook. Some other search was necessary, but I was always one to cast circles like a bird dog, so it was only a matter of a few minutes when, coming out on a low knoll within sight of the brook I perceived a slight depression 20 feet or more in diameter in the sod. Further examination showed fragments of rock around the grassy grown depression and in these pieces were the unusual black brilliant stubby crystals that have long been collected here.

Far be it from me, untaught in mineraloyy and geology, to disagree with the experts. But in this matter of the Pierrepont tourmaline location I am going to take an exception. Lay my findings before you and let you be the judge. First let me quote Agar on the subject. Mr. Agar quote:—

The author "woodchucked it" on his first visit. Pierrepont, N. Y. black tourmaline location.

"The tourmaline occurs as a band running from the brook intermittently up the hill for about 150 meters. A great many pits have been blasted in it; but it still forms a very conspicuous black band on the slope. Clusters of brilliant black crystals are abundant; and doubly terminated stubby polar crystals can, with care be dug out. End quote—Agar. (*Am. Min.*, Nov. 1921, p. 161)

Now I ask you to look at the picture captioned: Pierrepont Black Tourmaline location taken from the bank of Leonard Brook. Do you see any conspicuous black band on the slope? You see soil, and on the knoll what appears to be an outcrop. There is not one evidence of ledge protruding thru this soil from the brook to this so called outcrop. As to this outcrop —I dug a trench part way across that depression, which, as you will see from the other picture contained a lot of rock fragments after the organized 23 got thru with it. At the depth of one foot, less in some places, I ran into glacial sand and small water worn stones. There was no ledge underneath. In order to confirm these findings I dug shallow holes under several small boulders near by. In every case the same conditions were encountered. A few inches of soil and then sand and water worn stones which were foreign to this territory. Ledge no. Outcrop no. The famous Pierrepont black tourmalines were deposited there in a huge boulder by the glacier.

I collected some good clusters on my first visit. Some fine clusters of square terminated pyroxene crystals as well. That boulder must have been a mass of pockets.

Pierrepont, N. Y. black tourmaline location taken from the bank of Leonard Brook. Do you see any conspicuous black band here?

The second visit was of course not so successful. About all I got then was experience.

If this is organized collecting spare me the consequences, for at this rate there'll be no more minerals left to collect in another fifty years.

Now even if this locality is pretty well cleaned up I am going to give directions for finding it. Some day some one may wish to go there anl weep at its destruction. It has been a truly great locality in its time. As you come into Pierrepont from Canton, N. Y., on route 86, stop

A close up of the Pierrepont black tourmaline location after it had been dug up.

before getting far into town and enquire for the road where the CCC camps are. If you have not gone too far into town this will be to the left. This road is rough, crooked, and in wet weather, muddy. Passable however. Half way to your parking place you will see the CCC camps on your left. The road ends at a farm house on your right with a cart track crossing perpendicularly ahead. Do not attempt this track in anything less than a jeep. Leave the car in the farm yard. I suppose the little girls to whom I used to pay a dime and a chocolate bar to keep the goats from jumping on the hood and top of the car are now grown up. So make your own arrangements about the goats. Follow the cart track to the right until you cross Leonard Brook, a sizable stream. Just beyond the bridge over the brook and to the left is a gate into the pasture. Go thru the gate and follow slightly up hill on a hardly discernible cow path. In 150 yards bear left and keep 75-100 yards from the brook bank You should be rewarded shortly in comming out in the open on the low grassy knoll previously mentioned. There may be other boulders in the vicinity worth prospecting. I hunted for them also. But found none that seemed to warrant the heavy sledging necessary to open them up.

Give it a try anyhow; I wish you luck in finding some of these prized and now scarce specimens.

NATURE MAKES A MAZE — ALSO AN AMAZING POT HOLE.

Have you ever been in one of those amusement centers where everything that happens is laughable—to the spectators anyway? And found yourself surrounded by mirrors so that which ever way you turned seemed to be the way out—only it proved to be another mirror? If such is the case go to the following locality and try to find the mat of apatite, zircon and pyroxene crystals which is perched high on a cliff in one of the numerous valleys. With your past experience you may be able to find it as well as find your way out of that jumble of ridges. I'll give you Dahlburg's directions for making a start; but no directions I could give, not even Agar's complicated ones, would be of much use to you after you get in.

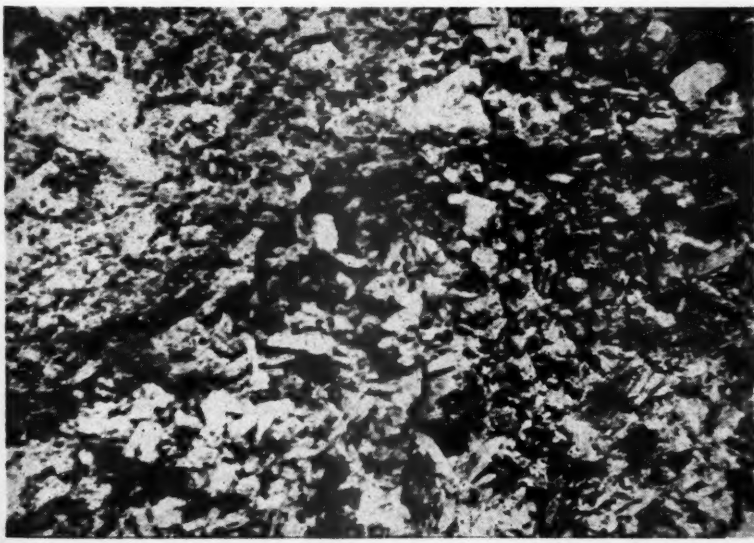
Mr. Dahlburg quote:—

Digging in the wreckage. Pierrepont, N. Y. black tourmaline location.

Looking at mat of pyroxene, titanite and apatite crystals on the ledge.

"About 1½ miles north of Rossie on the Rossie—Hammond road (route 185) ¼ mile south of where the road crosses Grass Creek there is a locality in excellent condition." End quote. (*Rocks and Minerals,* Aug. 1947, p. 720).

As you face up the road toward Grass Creek the area is to your left. It is a suc-

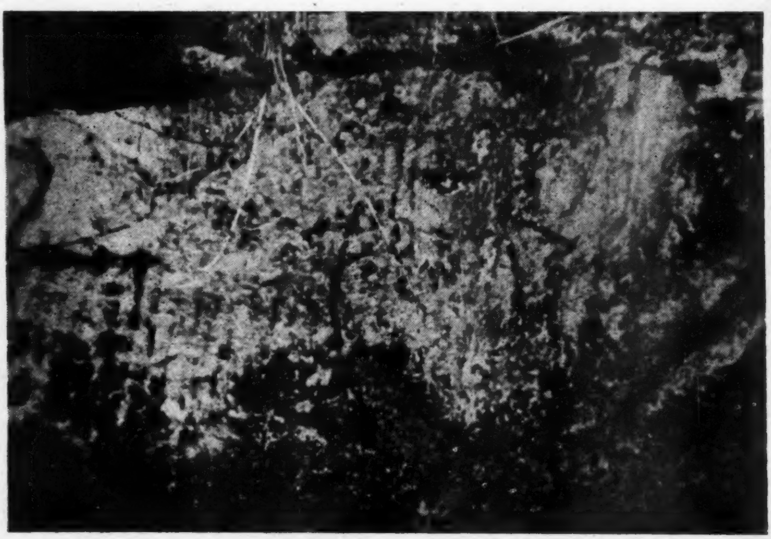


A close up of the crystals on the ledge

cession of northeast-southwest running ridges none of them much over 20-30 feet high. Between the ridges are narrow valleys and connecting many of the valleys are narrow passes. It is thru these valleys that you must search. As you travel southwest from the road thru these valleys keep sharp watch of the cliffs on your right. The mat of crystals will be on one of these. Even should you find the place there is no use in battering up the deposit. As Dahlburg says, "It is difficult to detach the crystals from the rock without shattering them." So leave them for others to enjoy. Of course tho, you want some specimens. So try digging at the base of the cliff. Sift the dirt and you will be surprised at the number of apatite and titanite crystals that you unearth. You may be lucky enough to come across a large specimen. Or a whole piece of the mat may have weathered away and be covered with soil. Agar says he found several. I did not have quite such good luck but came away satisfied with the handful of crystals I obtained. And more than satisfied with a nice specimen of fuchsite I found in a pegmatite outcrop way over on the southern edge of the area. I know—fuchsite is supposed to contain chromium. But don't ask me how chromium got up here in this country.

As you ramble thru these valleys looking for the crystals keep a sharp watch also for a small pile of sharp edged blasted rock beside a small cave at the base of one of the ridges. Let me quote from the Diary on this place. Quote

"About half way along the valley which had cliffs on the left about 30-35 feet high, and a steep ridge on the right rising 30 feet into the air, we came upon what at first glance appeared to be a small cave in the ledge. This was in the ridge on the right. As this was not the type of rock we were looking for, gave it only a casual glance—then looked sharper as a pile of blasted sharp edged rock lay to one side of the opening. Decided this needed an examination so crawling thru the hole on hands and knees came out at once in the bottom of a mammoth pot hole!!! Surprise? Words couldn't tell the story. Here on top of a 30 foot ridge of limestone, nowhere near water, and with the terrain showing (to my untrained eye) no signs of ever



The best picture that could be made of the top of the pot hole.

being a river bed, was a pot hole at least 10 feet in diameter and 25 feet deep. A perfect circular hole drilled into the limestone; with sides so smooth anyone could swear they were cut by a gigantic diamond drill". End quote.

Agar must never have seen this freak of nature for he does not mention it. Dahlburg calls it a "chimney". But I, who at an early age explored Cavendish Gorge in Vermont, name it for what it is. A pot hole. Worn in the solid limestone hill by the abrasive action of whirling and turning stones and gravel propelled by some swift running ancient river or glacial stream.

I am sorry that I could get no better picture of it than I have. But it was too large for my small camera. One other thought also comes to mind. Who blasted the hole into the bottom of the pot hole? Some geologist? If so, I would surely like to read his report.

As I read this chapter over, it appears as tho this were a territory in which one might easily get lost and forever wander around. It is not so. For a ½ mile walk in any direction will bring you out in pastures or back on the road, as it did us several times. So try the place if you have time and the opportunity. For I can assure you that in a very short time you will become charmed with Nature's maze.

(To be continued)

RAY LETSON FEATURED IN SHOP'S MAGAZINE

It has just been brought to our attention that Ray Letson, of Corfu, N. Y., one of western New York's most active collectors, was featured in the February, 1948, issue of his shop's magazine, *Doehler-Jarvis Journal*. As Mr. Letson is a member of the R&MA, it is fitting and proper that the interesting write-up be reprinted in *Rocks and Minerals*. The reprint follows:

Hobbies are sometimes tricky. We find the statesman laying bricks and stone, the blacksmith collecting butterflies, the clerk hammering out copperware, the foundryman hoarding stamps and so on far into the night.

We cannot place the interesting hobby of Ray Letson of Die Repair in this category, for what could be more natural to a metal worker than the collection and study of minerals? Ray began his collection when a boy at Wales Center, New York. Many of the minerals he gathered then are still to be found in his present large, diversified collection. He became seriously interested several years ago and intensified his research to the extent of trips to the Adirondacks, Vermont and New Hampshire to hunt for specimens, to trade and compare notes with other collectors. Friends, while on vacation, pick up samples and add them to his display. Duplicate specimens are used for trading and making up collections for beginners.

Ray finds the local area not too productive of minerals. An exception to this is a strata of dolomite that is quarried in Rochester and Lockport. In cavities in the dolomite are found excellent crystals of calcite, dolomite, selenite (a variety of gypsum), celestite and snowy gypsum.

Some collect from a standpoint of beauty only, others to study their characteristics, while a third group collect from certain localities. Ray's collection covers all three. The most beautiful display is of fluorescent minerals that glow in many colors when exposed to ultraviolet rays in a darkened room. Other minerals displayed represent the common metals used by Doehler-Jarvis, as well as less known metals. Four specimens represent the ores of uranium as used in atomic energy. In keeping with a fast gaining popularity of a branch of minerology, Ray has built a diamond saw and polishing lap. He hopes to produce polished slabs and gem stones soon.

Frances Ager, daughter of Gregory Ager of the Engraving Room in the Die Shop, and Marilyn, daughter of Allen Taber of the Cock Po. Line, both started collections with Ray's help.

Anyone wishing to see Ray's display will find the "Welcome" mat out, and a well versed person to initiate them into the wonders of the Mineral World.

ROCKS AND MINERALS

Who made the Rocks and Minerals,
The Silver and the Gold
That lay within this Mother Earth
For countless years untold,
The Coal that warms our firesides
And fills our rooms with light,
And Diamonds with their flashing beams
So beautiful, so bright,
The Rubies with their blood-red depths,
The Sapphire's peacock blue,
The Emerald, with its deep rich green,
The Agate's rainbow hue?

Who made the wondrous Opal,
Most beautiful of gems,
Renowned the wide world over
To Earth's remotest ends,
That mass of brilliant colour,
The Gem of Gems sublime,
With Red, Green, Violet, Blue and Black,
So exquisitely fine,
The Onyx and the Crystals,
The Azurite and Jade,
The Calcite and the Jasper,
So beautifully made,
The Zircons and the Garnets,
Hornblende and Hematite,
The Sodalite and Scheelite
And the Green Actinolite?

Who made the beauteous Labradorite
From distant icebound shore,
Those gorgeous bands of colour
That charm us more and more,
Or the deep green banded Malachite,
The Topaz, white and yellow,
The Beryl, that translucent gem
With colour soft and mellow,
And all those wondrous Minerals
With their rare fluorescent beams,
Such dazzling rays of beauty
Beyond our wildest dreams?

Who made these Gems and Minerals
That lie beneath the sod?
The answer—there is only one—
"In the beginning—God."

N. H. Seward
Kew. Melbourne, Australia.

ALL SEEK B.C. URANIUM
Rush Parallels Trail of '98

GOLD BRIDGE, B. C., Aug. 21—(C.P.)—There's uranium in British Columbia's Bridge River hills—but no one knows how much—and inexperienced prospectors who hit the trail poorly equipped are risking their lives.

This was the core of statements issued yesterday by Dr. F. F. Walker, Deputy Minister of Mines, and the B. C. Chamber of Mines.

Meanwhile, shares in gold mines in this district, 120 miles north of Vancouver, advanced yesterday on the Vancouver Stock Exchange on the basis of reports of uranium discoveries.

Disregarding official warnings, prospectors are responding to the lure with a rush that threatens to parallel the trail of '98.

The Mines Chamber reports some are rank amateurs who know almost nothing about staking, blazing trail or registering claims. Others are hard-bitten veterans who live for the zest of the hunt. A few are enthusiastic college graduates.

Ottawa officials Thursday confirmed the find of Joe Russell, 72, a grizzled Lillooet prospector who trekked out by moonlight to the new fields. The location is his abandoned jewel gold mine.

Many would-be miners who lack scarce Geiger counters are simply staking claims in the hills surrounding the proven ground. The Gold Bridge office has registered 96 so far.

Editor's Note: The above item was sent in by William Lord, of Montreal, Canada. Canada is full of minerals so it is not surprising that uranium ore should be found in the province of British Columbia. The discovery is interesting nevertheless but unfortunately the name of the ore is not given.

THEORIES OF EARTH ORIGIN

By RONALD L. IVES
Vice-President, Rocks and Minerals Association

INTRODUCTION

Theories of earth origin have been propounded, examined, and discarded with such dizzying rapidity, in the past two decades, that few students of the earth sciences have been able to keep track of their status. This difficulty has been increased by the publication of many of the theories in obscure scholarly journals, of small circulation, and by their statement, in too many instances, in overly abstruse astronomical and mathematical terms.

Salient features of the more important theories of earth origin, to date (1948), will be described here, in an effort to make this fascinating and rather important field comprehensible to the average intelligent man, who is not, and cannot be, an expert in his own field and also a well-read cosmogonist.

Although many of the formal presentations are almost literally "drowned in calculus", most of the mathematics can be reduced to simple algebra, or eliminated entirely, for all but scholarly presentations.

Not included in this summary is a vast array of very early theories of earth origin, found in the mythologies of most tribes, in which creation of the cosmos is attributed to the chance whim, or definite plan, of some tribal deity (often an evil spirit).

MONISTIC THEORIES

The earliest rational theories of the origin of the Solar System, as well as the more recent hypotheses of ter Haar and von Weizsacker, are based on the assumption that the entire system originated from a gaseous envelope surrounding a single star, without the application of external forces.

During the last three centuries, a number of astronomers, philosophers, and mathematicians have noted various apparent regularities in the Solar System, and have concluded therefrom that it was formed in accordance with some combination of natural laws. These regularities, which include the spacing and composition of the planets, the number of planetary satellites, and their common orbital plane, have been summarized recently by ter Haar. It was not until Newton stated his laws of universal gravitation, in 1687, that many of these systemic regularities became apparent.

Perhaps the earliest well developed monistic theory of systemic origin is that of Immanuel Kant, presented in 1755. This was followed, in 1796, by the Nebular Hypothesis, developed by the astronomer Laplace. Although it is difficult or impossible to account for all happenings in the solar system by means of any monistic theory yet published, parts of these various theories are in rational accord with both the astronomical evidence and physical laws as we now know them, so that, with all their shortcomings, the monistic theories still merit, and receive, continued study.

Starting point of all monistic theories is a star, surrounded by a cloud of gas or dust-sized particles of matter, as in Fig. 1, A and B. If the star and its atmosphere is not rotating, the atmosphere will tend to be and remain spherical. If, however, the atmosphere is rotating, the shape will not be a sphere, but a disc, perpendicular to the axis of rotation, as in Fig. 1, C and D.

That such configurations can occur about a star is amply shown by astronomical data, convenient examples being the ring nebula in Lyra, and the planetary nebula (NGC 2392) in Gemini [1].

Following development of a disc, fragmentation of the disc into concentric rings composed of gas or small particles is called for by the theories. Such behavior is common in nature, ring systems being formed in all sorts of rotating clouds from wind eddies only a few hundred feet across to cosmic eddies a few light-years in diameter. A convenient astronomical example is the ring system of the planet Saturn.

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(1) Photographs of these nebulae have been taken by the Mount Wilson Observatory, and comprise Figures 226 and 227 in Fath, E. A. *The Elements of Astronomy*, New York, 1944.

Formation of a planetary system from a ring system requires that the material forming the rings be gathered together into planets. Such accretion may take in a number of ways, the most probable method, in each hypothesis, being determined by condition of the material forming the ring system.

Formation of a direct-rotating planetary nucleus by shrinkage and condensation of a gaseous ring, rotating as a disc, is shown in Fig. 2, A. A similar planetary nucleus will be formed from a cloud of dust-sized particles, provided the cloud rotates as a disc.

Critics of the monistic hypotheses of Kant and Laplace point out that a gaseous cloud will not remain a rotating disc, as the outer portions will tend to pull away from those nearer the star as a result of centrifugal force, exactly as a saw will "explode" if rotated too rapidly. This tendency, plus the continuing expansive tendency of a gaseous atmosphere, led to the abandonment of monistic theories for some decades.

Quite recently, in part as a result of studies by ter Haar, a review of the monistic principles has been made, and the possibility that planetary nuclei could develop in eddies between the separated gaseous rings again merits consideration. One way in which this could occur is outlined in Fig. 3. Other, more complicated,

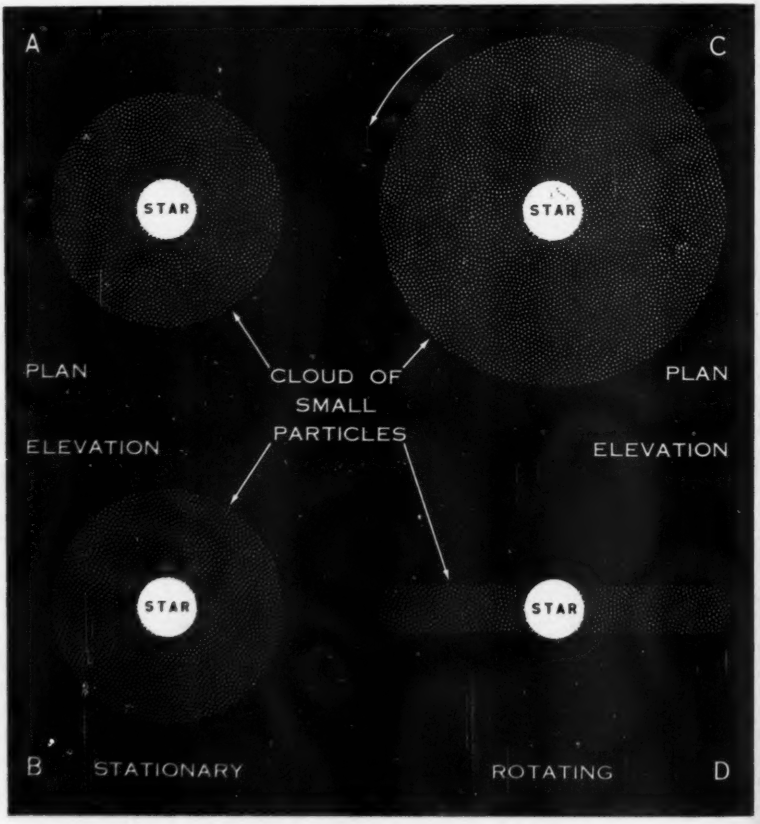

Fig. 1. Basis of monistic theories of earth origin.

Fig. 2. Formation of rotating planetary nuclei.

"gear train" eddies are entirely possible. Just how such an eddy will condense into a planetary nucleus, under the influence of centrifugal force, remains to be seen, but the formation of an eddy, or group of eddies, between rings, is contrary to no physical theory, so far as is now known.

The earlier monistic theories called for a disc of gas about a star; initially having the same radial velocity throughout its mass: a shrinkage of the gaseous disc; the linear velocities of the component zones being maintained; and final condensation of the disc into a series of planetary nuclei; each having direct rotation (as does the Earth). This original hypothesis could not be reconciled with the Kinetic Theory of Gases, which appears universally applicable. More recent theories call for disruption of the initial disc into rings, and to the formation of direct-rotating planetary nuclei in eddies between them. Although the German nuclear physicist, von Weizsacker, has quite recently shown that conditions within such an eddy are much more favorable to condensation than those in a ring, the Kinetic Theory of Gases and centrifugal force still seem to bar complete acceptance of monistic theories of earth origin.

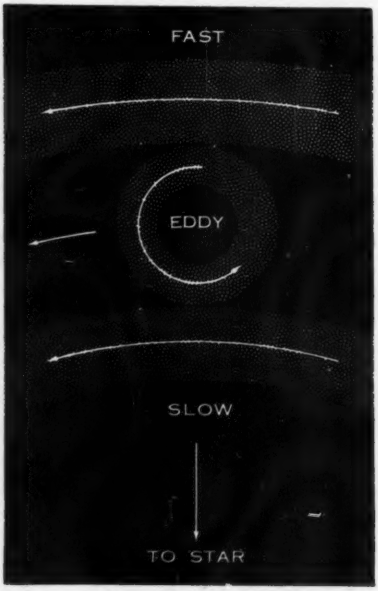

Fig. 3. Formation of eddy beteen gasous rings in a stellar atmosphere.

CATASTROPHIC THEORIES

With the apparent failure of the earlier monistic theories to account for origin of the solar family of planets, a number of new theories, attributing systemic origin to conflict of the gravitational fields of two stars, one of them the Sun, arose. Chief contributors to these theories were T. C. Chamberlin, F. R. Moulton, Sir James Jeans, Joseph Barrell, and Harold Jeffries.

All of these catastrophic theories attribute the generation of planetary material to solar damage resulting from either a direct collision (improbable) of another star with the sun, or (more probable) to the pulling away of a tidal bulge on the sun. This tidal bulge was both created and pulled away by another star.

This tidal disruption produced a somewhat diffuse solar atmosphere, with matter unevenly spaced. From this solar cloud of matter, probably in the form of fine dust, the planets condensed. Variations of this elementary theory are numerous. Not clearly shown by any variation until recently was the manner in which the planets acquired their angular momentum (the momentum which keeps them in their orbits). An earlier difficulty, that of direction of rotation, was cleverly solved by Chamberlin and Moulton. Under purely gravitational influences, with the dust particles occupying orbits about the sun, as do the planets today, the particles in outer orbits would have a lesser linear velocity than those in inner orbits, so that combination of groups of particles from different orbits would produce planetary nuclei having retrograde rotation (clockwise, and opposite that of Earth). This is shown diagrammatically in Fig. 2, B. Chamberlin assumed, with at least theoretical correctness, that the orbits of the planetesimals (dust-sized particles which occupied orbits) would be elliptical, as are planetary orbits today, and hence would obey Kepler's Law. This law states that the radius vector (line

from planet to center of sun) of a planet sweeps over equal areas in equal time intervals. In consequence, linear velocity of any planet is greatest when it is closest to the sun (perihelion), and least when it is farthest away (aphelion). If, now, the system contains two swarms of planetesimals, occupying orbits of such dimensions that the perihelion distance of the larger equals the aphelion distance of the smaller, close approach, or coincidence, of these points will produce an eddy similar to that shown in Fig. 3. In this instance, however, the components of the eddy are not gas molecules, but dust-sized particles of solid matter; and they are subject to collisions with others in both swarms, so that they tend to be driven together. Under these conditions, condensation into a planetary nucleus is not impossible. The arrangement of orbits necessary for such an occurrence is outlined in Fig. 4.

Quite recently, as a result of studies by a British astronomer, R. A. Lyttleton, the troublesome problem of angular momentum is nearer solution. Lyttleton postulates, as an initial condition, a sun with a companion star. Disruption of this companion by collision with a stellar intruder supplies the requisite material and the requisite angular momentum, for the present system of planets. Lyttleton himself proposes several alternatives, all quite similar. An additional possibility, based on studies by the French astronomer,

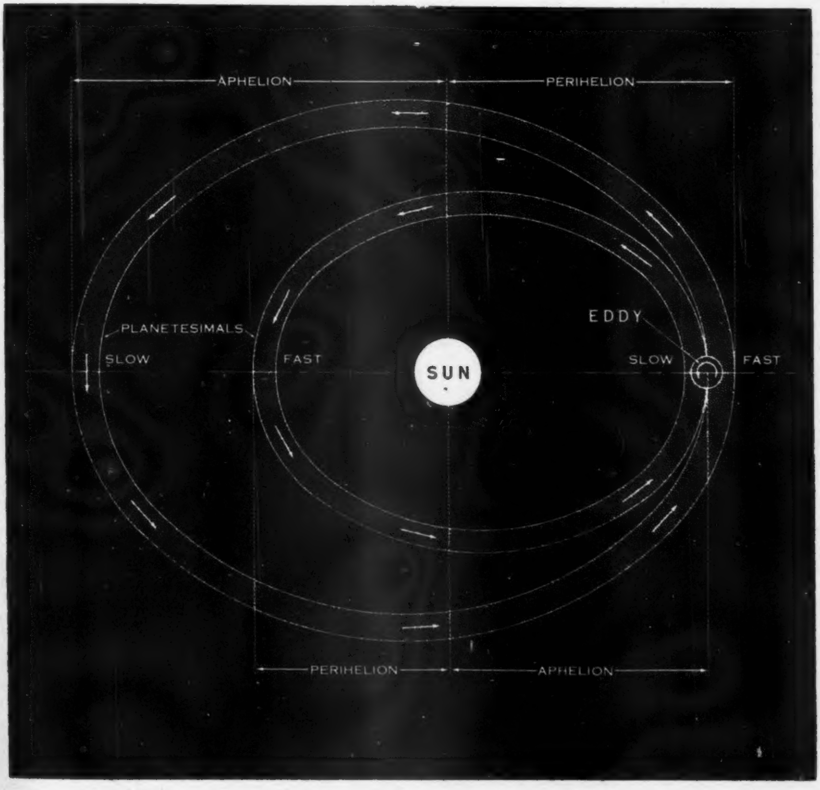

Fig. 4. Production of a forward-rotating planetary nucleus by collisions at the point of osculation of two elliptical swarm orbits.

Roche, is here suggested. Roche's investigations show that when a satellite (or companion star) approaches too close to its primary (in this case the Sun), it is torn apart by tidal stresses. Should a former companion of the sun, of requisite dimensions and rotation, have approached too close, it might have furnished the material now composing the planetary system. The kinetic energy of this extinct solar companion, being indestructible, would now appear as the angular momentum of the planets.

As with the various monistic theories, the catastrophic theories of earth origin are not entirely satisfactory, although several of the catastrophic theories, notably those of Lyttleton, developed from the older hypotheses of Chamberlin and Moulton, explain a large number of the relations in the solar system. In consequence, after all disproved or doubtful portions of the catastrophic theories are eliminated, a considerable amount of theoretical and observational material remains, upon which an improved or entirely new hypothesis may be based at some future time.

"COSMIC TRAP" HYPOTHESES

More than a generation ago, astronomers noted that very diffuse clouds of finely-divided matter, such as the tail of a comet, were repelled from radiating bodies of high mass, such as the sun. This repulsion, occurred when the repulsive force of radiation (radiation pressure) exceeded the attractive force of gravitation.

Quite recently, the atronomer F. L. Whipple has shown that in the space between a group of stars, properly arranged (such as four stars at the apices of a regular tetrahedron), it is possible for material ejected from the stars to be trapped, so that it cannot escape without the application of an external force. Should enough material accumulate in such a "cosmic trap", the temperature within the cloud would tend to rise, and, after a complicated series of physical changes, condensation of some of the trapped material might take place. Given proper mechanical stimulus, a planetary system could develop within this "cosmic trap" by fairly standard accretive processes. Although full details of this hypothesis have not been published as yet, the reasoning behind it is at least rational, so that further consideration is merited.

CREATION OF MATTER IN SPACE

Suggested many times by astrophysicists and others is the possibility that the now-famous Einstein Mass-Energy equation

$$E = mc^2 \quad \text{or} \quad m = \frac{E}{c^2}$$

In which:-

E = energy in ergs (10^7 ergs per second = 1 watt)

m = mass in grams

c = a large constant, numerically similar to the velocity of light, stated in centimeters per second (this is approximately 2.998×10^{10} or 29,980,000,000.).

can be worked "both ways". That energy can be developed by the destruction of matter has now been amply demonstrated, as the surviving residents of Hiroshima and Nagasaki will be glad to testify. If, under conditions not specified, radiant energy in space is converted to matter, an additional source of planetary and stellar material is indicated. Whether this actually takes place, and whether it ever did take place, remains, for the present, an unanswered question.

PLANETARY ACCRETION

All of the theories of earth origin which still merit consideration, even in part, call for accretion of the planets and their satellites from a cloud of dust in

some sort of motion. It is entirely possible that, when we observe falling meteors, we are witnessing the final phases of this accretive process.

Although all features of the process of accretion could only be described in a rather thick book, salient theory is relatively simple, and can be outlined by use of Newton's Laws and elementary algebra.

Any particle in the neighborhood of any star, if the particle has no initial motion, is subject to the attractive force of gravitation, and the repulsive force due to radiation pressure. These forces, for any star and particle, may be evaluated from:—

$$(1)\quad Fg = G\frac{Ms\,Mp}{S^2} = G\,Ms\frac{\frac{4}{3}D\pi r^3}{S^2}$$

$$(2)\quad Fr = -R\frac{Ap}{S^2} = -R\frac{\pi r^2}{S^2}$$

$$(3)\quad Fg + Fr = \Sigma F = GMs\frac{\frac{4}{3}D\pi r^3}{S^2} - R\frac{\pi r^2}{S^2}$$

$$(4)\quad \Sigma F = \frac{\pi r^2}{S^2}\left|\frac{4}{3}D\,r\,G\,Ms - R\right|$$

In which:-

Fg = Gravitational force (attraction)

G = Gravitational constant

Ms = Mass of star

Mp = Mass of particle

S = Distance separating star and particle

D = Density of particle

π = 3.14159……

r = Radius of particle

Fr = Radiational force (repulsion)

R = Radiational constant

Ap = Cross sectional area of particle

ΣF = Total force acting on particle

Here, the first equation is a mathematical statement of Newton's Law of Gravitation, first stated in terms of the masses of the star and particle, and then restated in terms of the mass of the star and the radius and density of the particle. This is a permissible restatement because the mass of a body is equal to its volume multiplied by its density.

In the second equation, the radiational force is stated in terms of the cross-sectional area of the particle (first), and of its radius (second). Combination of the first two equations, to produce a statement of the total force acting on the particle, comprises the third equation, which is simplified to produce (4). Here, the force acting on the particle will be either

positive (tending to move the particle inward) or negative (tending to move the particle outward), depending upon the sign of the quantity within the parentheses. When the total force is zero, the particle will "stay put", wherever it is, until and unless some external force acts upon it.

In consequence of the above, a lasting cloud of particles in certain size-density ranges can exist about any star (or star cluster). The same reasoning (formula 4) can be applied to determine the fate of a particle in the "cosmic trap" between four (or more) stars in a space pattern. Although the mathematical presentation is too lengthy for inclusion here, it shows that when the total force on a stationary particle is zero, the particle will retain its position, and that, if such a particle is displaced, it will tend to return to a definite position, relative to the stars.

When a particle near a star has, or acquires, motion perpendicular to a stellar radius, it will tend to acquire an orbit about the star, and hence will become subject to centrifugal force. When the total force acting on the particle (gravity, centrifugal force, radiation pressure) is zero, the orbit will be stable, and the particle will remain a satellite of the star until extraneous forces act upon it. If the total force is positive, the particle will tend to move inward, usually in a spiral; and will either attain a stable orbit near the star, or fall into it. If the total force is negative, the particle will move outward, probably in a spiral, either to a distant stable orbit, or until it "escapes" from the system.

This behavior can be evaluated mathematically from the formulae:—

$$(5) \quad Fc = -mS\omega^2 = \tfrac{4}{3}D\pi r^3 S\omega^2$$

$$(6) \quad \Sigma F = Fg + Fr + Fc = \frac{\pi r^2}{S^2}\left(\frac{4}{3}DrGMs - R\right) - \tfrac{4}{3}D\pi r^3 S\omega^2$$

In which:-

Fc = Centrifugal force

ω = Angular velocity of particle in angular units.

An initially chaotic stellar environment, filled with partices of assorted sizes, shapes, and motions, will tend to become somewhat organized very quickly, with the expulsion from the system of all very small particles, for which there are no stable orbits; and the assimilation, by the star, of all large particles which cannot attain reasonably stable orbits.

This early organization is a relatively quick process, even in terms of human chronology. Like many other natural processes, it proceeds at a declining rate, as does radioactive disintegration, so that a few residuals from the hypothecated initial chaos may well be present in the solar environment today, about two and a half billion years after "creation" of the solar system.

During, and immediately after, the initial "clearing" of the stellar environment by expulsion of small particles, and assimilation of larger particles that are unable to acquire stable or nearly stable orbits, the stellar environment will be occupied by a large number of particles, most of them in at least temporarily stable orbits. From these numerous microsatellites, the planets and their various moons will eventually be formed by the processes of accretion.

If a large number of particles, each of the same (small) size, and each having an independent orbit, occupy a ring or zone about a star; the angular velocity in the outer orbits, due to reduction of effective radiation pressure by shadowing, may be greater than that in the inner orbits, and collection into a spheroid, having direct rotation, may be possible, as is indicated in Fig. 2, C. Extreme orbital instability, with consequent multiplicity of collisions

may be postulated for such a system, because of variations in the radiation incident on the various particles.

Unfortunately, however, this highly plausible explanation fails in just the size range where it should be most effective. Any body which receives radiation must either reflect it, in which case it is subject to a force away from the source of the radiation equal to twice the radiation pressure; or absorb it, in which case the body becomes warmer; or, after attaining an equilibrium temperature, radiate as much energy as it receives. This reradiated energy exerts pressure in exactly the same manner as does the received radiation, so that the gravitational attraction of two bodies in the same radiation field is in part offset by the pressure due to reradiated energy. This is shown by:—

$$(7)\quad Frr = -\frac{R \cdot \pi r_1^2}{S^2 \cdot 4\pi Z^2} - \frac{R \cdot \pi r_2^2}{S^2 \cdot 4\pi Z^2} = -\frac{R}{4S^2Z^2}(r_1^2 + r_2^2)$$

$$(8)\quad Fgz = G\frac{Mp_1 Mp_2}{Z^2} = \frac{G}{Z^2}\left(\tfrac{4}{3}\pi r_1^3 D_1\right)\left(\tfrac{4}{3}\pi r_2^3 D_2\right) = \frac{16G\pi^2}{9Z^2}(D_1 D_2 r_1^3 r_2^3)$$

$$(9)\quad \Sigma Fz = Frr + Fgz = \frac{16G\pi^2}{9Z^2}(D_1 D_2 r_1^3 r_2^3) - \frac{R}{4S^2Z^2}(r_1^2 + r_2^2)$$

In which:

Frr = Reradiational force acting between particles

r_1 = Radius of particle 1

r_2 = Radius of particle 2

Z = Distance separating particles

Fgz = Gravitational force between particles

Mp_1 = Mass of particle 1

Mp_2 = Mass of particle 2

D_1 = Density of particle 1

D_2 = Density of particle 2

ΣFz = Total force acting between particles

Similar mathematical reasoning can be applied to account for any other factors which may need consideration in accord with any specific theory.

If, in (9), we substitute known constants from standard physical tables, we find, at earth's distance from the Sun, that two equally-sized particles, of the density of surface rock materials, will repel each other if they are both smaller than golf balls; and will attract each other if they are both larger. Even if pulled together by attraction, there is no evidence that they will combine into one body.

If, however, one particle is much larger than the other, the larger particle will attract the smaller, so that a body as large as a basketball will attract one somewhat smaller than a golf ball. As the size of the larger body increases, the minimum size of the smallest body that it will attract decreases slowly. In consequence, large bodies will tend to increase in size, while smaller bodies will not.

Schematic relations of two bodies at

the same effective distance from a star are shown in Fig. 5, with forces acting upon them indicated in accord with (8) and (9).

Conditions within a stellar debris cloud, in which the various components have assorted sizes and densities, are not only extremely complex, but many of the details, outlined elsewhere, are not pertinent to this discussion.

When two fairly large bodies occupy the same orbit, they will eventually collide unless they not only have the same angular velocity, but are separated by about 120° of arc about the orbit, as are the Trojan asteroids and the Planet Jupiter.

If the two bodies are not of the same size, and one of them is quite small, so that the influence of radiation pressure is appreciable, it will tend to be overtaken by the larger body, which must travel the orbit faster to maintain its position relative to the star. Mechanics of such a collision is outlined in Fig. 6. In A, the two bodies, X and Y, which occupy the same orbit, are shown some distance apart. The relative effects of gravitation (G) and radiation pressure (R) upon each are indicated by the bar scales beneath the bodies. Body X, having a mass relatively large with respect to its cross-sectional area, is relatively less subject to radiation pressure, and has a greater orbital velocity than Y, so that it will tend to overtake and collide with Y, which has a smaller mass with respect to its cross-sectional area, and hence is relatively more subject to radiation pressure.

When the two bodies come fairly close together, that part of mutual gravitational attraction which is not offset by the pressure due to reradiation will accelerate X, being in the direction of orbital motion; and will decelerate Y, being opposed to the orbital motion of that body. In consequence, X will tend to seek a slightly larger orbit, and Y a slightly smaller orbit.

Relations of the two bodies after mutual attraction has operated for some time are shown in Fig. 6, B. Because of the change in orbital velocities resulting from mutual attraction, the overtaken body will always collide with the faster-moving overtaking body at some point sunward of center, as is indicated in Fig. 6, C.

Unless the two bodies are not only perfectly elastic, but have truly smooth surfaces, such a collision will impart a direct rotation to the overtaking body, and will reduce its orbital velocity, causing it to seek a slightly smaller orbit, as in Fig. 6, D. If the overtaken body bounces off, it will, at least temporarily, be driven inward; and may eventually attain a new

Fig. 5. Effects of mutual gravitational attraction and reradiational repulsion on two adjacent bodies in the environment of a star. Below a certain minimum size, for any given stellar environment, mutual attraction of the particles will be offset by the force due to reradiation.

stable orbit, of dimensions determined by its new radial velocity.

If, however, the two colliding bodies combine into a new body, Z (Fig. 6, D) the mass of the new body will be the sum of the masses of the two components, and the volume of the new body will be the sum of their volumes. The cross-sectional area of the new body, however, will be considerably less than the sum of the cross-sections of the two components, so that the effect of gravitation will be the sum of the gravity effects upon the two components, whereas the effect of radia-

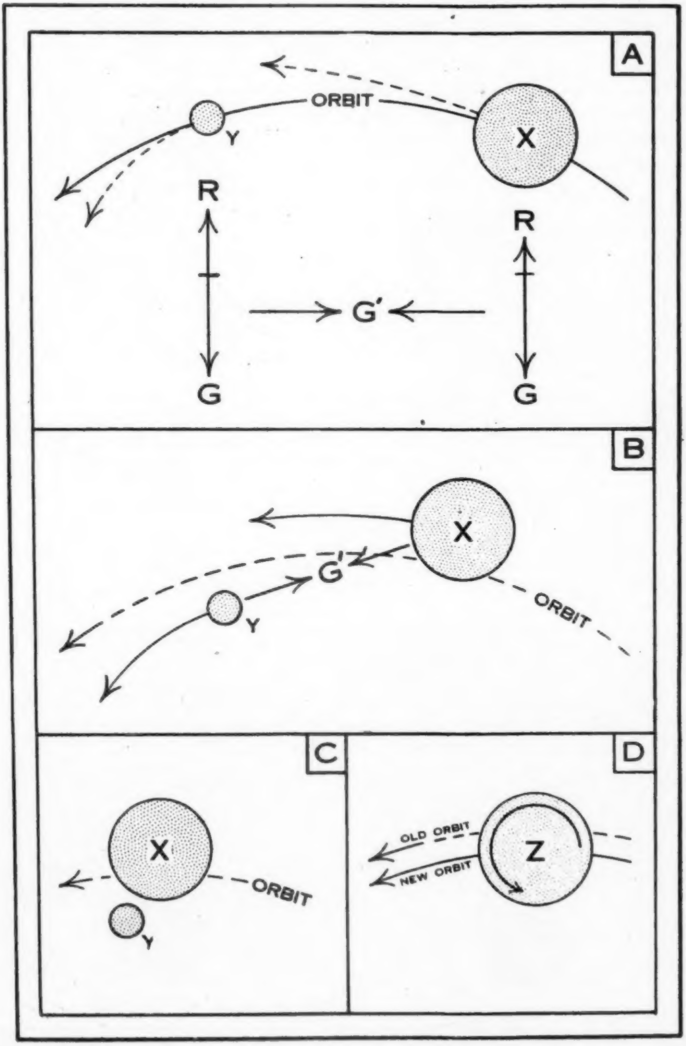

Fig. 6. Summary mechanics of a collision between two co-orbital bodies in a stellar environment. This figure is not to scale.

tion pressure will be less than the sum of the radiation pressures operating on the two original bodies. This is a manifestation of the well-known "square-cube law".

In acquiring a new stable orbit, this new body must move inward, toward the star, for not only is effective gravitation greater upon the new body, but a portion of its kinetic energy has been converted from angular momentum in orbital motion to axial spin. While seeking the new orbit made necessary by this conversion of momentum, multiple collisions with slower-moving particles in smaller orbits are to be expected.

The net result of collisions of co-orbital and nearly co-orbital bodies is a sweeping of the space about the primary, so that the number of free bodies is markedly reduced. Some or much of the kinetic energy of the system is also converted from orbital velocity to axial spins.

This mechanism is roughly outlined in Fig. 7. Here, during the earlier stages in the development of a planetary system (A), two large bodies, A, and B, and myriad smaller bodies, are shown in orbits about the primary, a radiating body, such the Sun.

These, by collision and combination, will grow and move inward, toward the primary, attaining, after many collisions, sizes and orbits designated by A' and B' (Fig. 7, B).

When body A' moves inward and reaches the relatively clear space of the initial orbit of body B, the number of collisions will be markedly reduced, and A' will tend to occupy that orbit permanently. Body B' (Fig. 7, B) will continue to grow by accretion, and to move inward, until it, in turn, attains a stable orbit in a relatively clear zone (not shown), or, coming within the Roche Limit, is torn apart by tidal stresses.

Qualitatively, the production of planetary rotation by impacts between a plane-

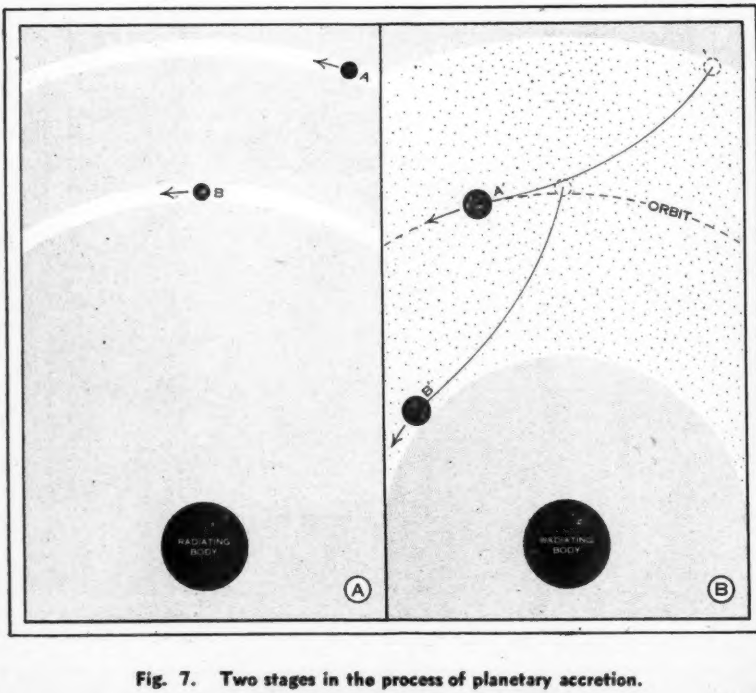

Fig. 7. Two stages in the process of planetary accretion.

tary nucleus of fairly large dimensions and many small, substantially co-orbital, particles wholly or partially supported by radiation pressure, seems entirely practicable. Qualitatively, the hypothesis will only be workable if there is, or could be, enough supported material in and near the orbit of the nucleus to produce rotation of the planetary nucleus by collisions. Unlike many parts of the various theories of earth origin, this hypothesis can be checked rather easily.

At the present time, at Earth's distance from the Sun, the amount of material of the density of terrestrial materials that can be supported by the pressure of solar radiation is about 1/2500th of the mass of the Earth. About one quarter of this is close enough to Earth's present orbit to take part in a former accretive process. Under these conditions, the rotation of the earth could be accounted for by the processes of collision and accretion if the kinetic energy of these supported particles relative to the Earth (i.e. released on collision with the Earth) equals or exceeds the kinetic energy of rotation of the Earth.

This may be evaluated and tested as follows:—

$$\overset{\text{KINETIC ENERGY OF PARTICLES}}{\frac{M_p V^2}{2}} \underset{\text{IS EQUAL TO OR GREATER THAN}}{\geqq} \overset{\text{KINETIC ENERGY OF TERRESTRIAL ROTATION}}{\frac{M_e r_e^2 \omega^2}{5}}$$

In which:-

M_p = Mass of available particles = $M_e \times 10^{-4}$

M_e = Mass of Earth

V = Earth's orbital speed = $\frac{2\pi \times 93 \times 10^6}{365}$ Miles per day

r_e = Radius of Earth = 4,000 Miles

ω = Earth's axial rotation = 2π Radians per day.

$$\frac{M_e \times 10^{-4} \times (2\pi \times 93 \times 10^6)^2}{2 \times (365)^2} \geqq \frac{M_e \times (4 \times 10^3)^2 \times (2\pi)^2}{5}$$

The factor $(10^6 \times M_e \times (2\pi)^2)$, being common to both sides of the equation, cancels out, leaving:

$$\frac{10^2 \times 93^2}{2 \times 365^2} \geqq \frac{16}{5}$$

And:-

$3.25 \geqq 3.20$ Q. E. D.

Thus it can be demonstrated that terrestrial rotation could have been produced by impacts with supported material in and near the Earth's orbit; and that the amount of this material is compatible in magnitude with the supporting power of solar radiation. The mathematical demonstration does not, however, show that this is what happened. It only shows that it could have happened.

CONCLUSION

As should be obvious at this point, there is no completely satisfactory theory of earth origin. Most of the theories propounded in the past contain specific elements of correctness, yet do not, in their entirety, explain earth origin successfully. It might be supposed that the research expended in formulating, and later is disproving, these various theories was wasted. A more careful consideration, however, shows that the new knowledge that must be discovered to disprove a seemingly-satisfactory theory of earth origin has so many other applications that it amounts to a major step forward for science as a whole. Only a thorough study of mechanics, based on Newton's Laws of Motion and Gravitation, will demonstrate the impracticability of the original Nebular hypothesis of earth origin. The Chamberlin-Moulton Planetesimal Hypothesis appeared entirely workable until great advances were made in the science of thermodynamics. Increasing knowledge of radiational mechanics has revived parts of the earlier monistic hypotheses; indicates that the cosmic trap theories merit further consideration; and may revive parts of the planetesimal hypotheses. The same knowledge, applied on an atomic scale, instead of a cosmic, may solve man's power problems at some time in the far future.

Any successful theory of earth origin must explain, in full accord with physical laws, where the material comprising the planets came from, and how it attained its present positions, motions, and chemical composition.

That a part of planetary construction took place in some sort of accretive process, which also accounts, in part at least, for planetary rotation, seems undeniable. Later phases of this accretive process are in complete mathematical accord with known physical laws and probable earlier conditions. Not made clear by any present theory is the initial formation of planetary nuclei. Once fairly large nuclei are present in the vicinity of the Sun, and acquire definite orbits, the rest of the accretive process is quite clear and simple. The question remaining is "where did the nuclei come from?". It can be suggested that these are pieces of a disrupted ancient companion to the Sun, which in the course of time came too close to its primary and was torn apart by tidal forces; but proof that this happened is not available.

At present (1948) it appears that more work is needed in the field of cosmogony, and that this work, whether it eventually shows what happened, or merely demonstrates that a number of proposed theories are unworkable, will lead to definite advances in knowledge.

ACKNOWLEDGMENTS

The writer is indebted to Lt. Robert A. Boyd, USNR, for many helpful discussions of the problems of planetary accretion; and to Dr. F. K. Edmondson, of Indiana University, for criticisms of parts of this paper.

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HUMAN RELATIONS AND THE ATOM

Remarks by **DAVID E. LILENTHAL**, Chairman

United States Atomic Energy Commission, at Preview Supper for Opening of the Atomic Energy Exhibit at the Golden Jubilee Exposition, New York City, August 21, 1948

It is a privilege, a happy privilege, to participate in the opening of this Jubilee of the formation of Greater New York. This celebration is in the best American tradition. For though we are by common accord the most forward-looking people on earth, we never lose an opportunity—as this great Jubilee demonstrates—we never lose an opportunity to celebrate our past. And the events of our past we most delight to honor are those achievements that represent the greatest of our skills as a people, and the greatest hope for the future.

It is not our riches we most celebrate, nor our great scientific, and technical advances, nor even advances in medicine or industry or military progress or artistic and literary excellence. No, we reserve the demonstration of our highest respect and most intense feeling of pride in quite another kind of progress—in those events that carry us along the road we believe most important of all—the art of getting along together.

We Americans understand with great clarity that learning the art of getting along together is mankind's most difficult and by all odds its most important and most rewarding problem. To us that great social invention, our Constitution and the Bill of Rights, is mightier in our esteem than the invention of the electric dynamo; the fact that here in Greater New York eight million people have developed ways of working together in peace and dignity is more important than all New York's skyscrapers, world famous though they are.

We see that learning how to make scientific advance serve mankind, how to make it part of the stream of man's everyday living, is more difficult, more subtle and more important than the solution of technical riddles. We see in the United Nations a great effort to develop further those very skills of living together in peace and justice, and in generousness of spirit, that we in this country have carried forward among ourselves with such heartening success. The day of science and technology in which we live increases rather than diminishes the importance of these social inventions.

The most noteworthy recent achievement of science and industry—the release of the energy within the atom—is an illustration on a grand and dramatic scale of this very proposition.

This discovery had behind it more than 30 years of the work of many minds in many lands throughout the world. The development of the atomic bomb itself was the result of the working together of men of science and technology in Great Britain, Canada, the United States. The even more difficult and more important task of living with the atom, the problem of effective international control, is also one that has seen the pooling of the minds and purposes and efforts of men in many countries. It is an effort thus far not crowned with success it is true—far from it—but one that will and can be solved only by the principles of human cooperation, principles espoused by this country and by the spokesmen of many other nations as they were discussed, for so many patient months, at Lake Success.

As I have said, the wartime development of atomic energy, of the atomic bomb, is an illustration of these very things.

Beginning in 1940, before Pearl Harbor, scientific knowledge, useful in war, was pooled between the United States and Great Britain. It was under that general policy that research on the atomic bomb began. In his statement August 6, 1945, announcing the use of the atomic bomb,

President Truman said that the availability in the United States of a large number of scientists and the essential industrial and financial recources necessary for atomic energy development, plus the relative security of the Western Hemisphere, were the important reasons behind the decision of President Roosevelt and Prime Minister Churchill to locate and carry on the major portion of the effort in the United States and Canada. Accordingly, scientists of these three governments joined efforts and shared information in many parallel fields during the war years.

In August 1943 the three governments established a committee known as the Combined Policy Committee, consisting of representatives of the United States, Canada, and the United Kingdom, to provide broad direction to the atomic project as between the countries. As announced in the August 6, 1945, statement of the Secretary of War, the Committee provided for interchange of information on certain sections of the secret project, interchange necessary to achieve the objective of developing atomic weapons during the war, and it took action to insure adequate supplies of the uranium ore essential to the production of the atomic weapon. A guide for the release of information held in common by the three nations was subsequently used by the three national atomic energy projects. This guide was revised by scientists of the three nations in November 1947, and will be jointly reviewed by them again at a meeting in London next month.

When the atomic bomb burst upon the world in August 1945, the three governments recognized that this new and devastating force placed upon them and the rest of the world a grave responsibility. This feeling was expressed by the three governments in the Truman-Atlee-King Declaration of November 15, 1945. That Declaration stated that the application of recent scientific discoveries requires that the entire civilized world devise means to insure that atomic energy shall be used for the benefit of mankind instead of a means of destruction. The three nations, acting together, made the specific recommendation that the United Nations should establish a commission to consider at once the problem of international control of atomic energy.

With the establishment of the United Nations Atomic Energy Commission in 1946 and the submission of the Baruch proposals for the United States for a just internationalization of atomic energy, the activities of these three nations, along with those of many other peace-loving nations, have been directed toward the solution of this urgent problem.

In the summer of 1946, Congress passed the Atomic Energy Act which established the United States Atomic Energy Commission. Thereupon the wartime cooperation between the three governments quite naturally had to be viewed in the light of the responsibilities thus fixed by Congress upon the new Commission as well as considerations of foreign policy and national defense.

The wartime experience shared by the three governments provides a convincing demonstration of the mutual benefits to be derived from cooperative effort. Recognizing this, the three governments concerned are continuing to utilize, in an expanded way, the cooperative principle in certain limited areas in which work has been proceeding separately along the same lines in two or more of the three countries. In some of these fields all three nations are working. Consequently, on some occasions all three nations are represented in consultations on specific topics concerning atomic energy; at other times, only two of the three are involved.

This program of technical cooperation is carried out under the general direction of the Combined Policy Committee which also reviews those problems of raw materials supply common to the three governments.

The general framework thus provided has been utilized to develop technical consultations on specified topics and to provide for a number of visits by scientists and technicians of each country to the other two. The health and safety factors in connection with the Canadian atomic installation at Chalk River, Ontario, for

example, have been examined in the light of the technical experience of the United Kingdom and the United States. The United States is concerned with the development of reactors which constitute a unique tool in nuclear research. The United States, as well as Canada and the United Kingdom, can share some of this experience in connection with reactors to achieve mutual benefit to all three governments. Experience and knowledge in the important field of extraction chemistry acquired by the United States and the United Kingdom can be of mutual benefit to the activity of each nation in this area.

Two years ago, in his history-making address to the United Nations Commission on Atomic Energy, Mr. Bernard Baruch laid before the peoples of the world the American proposal for international development and control of this newly discovered knowledge. That proposal would have extended on a world-wide scale the cooperative principle so central to American life, the principle of cooperation among all men and among all nations, applied to the development of atomic energy for all of its vast benefits to mankind. By the same measures of cooperation that proposal would have extended to all mankind, safeguards against the misuse of atomic energy for destruction and coercion.

But, as the President said on July 24," ... the uncompromising refusal of the Soviet Union to participate in a workable control system has thus far obstructed progress."

Where does this leave us, today, more than three years after Hiroshima, in our efforts to apply to atomic energy the principles of working together in peace, for mutual benefit?

Let me try to state the situation briefly, as I see it.

The United States has made an offer to the world for international control that stands as a significant event in man's moral history. On the basis of that proposal many nations have together worked out an effective plan of control which is now the plan of a large segment of the world's peoples. But, for the time being, international control is blocked. In the absence of such agreement, the United States is pressing forward with its own program of research and development in every aspect of atomic energy, a program of the greatest magnitude and intensity. This undertaking is yielding even at this early date, knowledge basic to human life, knowledge strikingly new and far-reaching in its future consequences.

We would have very much preferred that this important work could be carried on openly and cooperatively, in accordance with our proposal and our principles. But with no international agreement "Our need for security," again to quote the President's statement, "our need for security in an insecure world compels us at the present time to maintain a high order of secrecy in many of our atomic energy undertakings." He then continued, "When the nations of the world are prepared to join with us in international control, this requirement of secrecy will disappear."

As a citizen, it seems to me it is a good record, this record of the American people in the three years since the atomic weapon came upon the world:

A people that believes in world cooperation has made a remarkable proposal, distinguished for its reasonableness, its adherence to the scientific facts, and its high moral ground.

We can be glad, too, that our U. N. representatives, Mr. Baruch, Senator Austin, and Mr. Osborn, have protected us against a mere paper agreement, an agreement without reality and hence worse, far worse, than no agreement at all.

We are going ahead on the only path presently open to us, that is increasing our own preeminence in all aspects of atomic energy, going at this hard, with everything we've got.

We have left the door open to international agreement and that kind of openness and world-wide cooperation among peoples in which we deeply believe, and to which our history and our vision commit us.

AMETHYST NEAR HIGHTOWER BALD, GEORGIA

(Reprinted from Georgia Mineral Society **News Letter**—August, 1948)

Several months ago, the Georgia Appalachian Trail Club took a trip to Hightower Bald in Union County, (northern Georgia). There is a woods road which follows Shoal Creek nearly to the base of the Bald, but it is a bad road at any time; thus generally not passable to cars. The Club camped on this trail for the evening, and several members reported the discovery of pieces of amethyst in the stream.

On July 4, Sam Knox and the Editor (of the *News Letter*) decided to investigate these reports. We went by Gainesville and retraced the trail over Unicoi Gap. The wildcat at Mr. Makison's store was engaged in eating a large fat hen. She gets four of them a week. Having inquired at the Game & Fish Department upon how one catches a wildcat, and having received several different explanations, we asked Mr. Makison about his cat. He stated that he choked her down with a forked stick. He stated that cats choke easily, and he picked her up limp and dropped her in the wire cage. Then he patted her to give her artificial respiration and she jumped back into life as quick as lightning. As for me, I prefer minerals!

To return to the subject, continuing down the mountain to the intersection of the Hiawassee and Clayton road, we turned right toward Clayton, going as far as the State Plaque on "Montgomery Corner." There we turned left, going by Hightower Creek past Titus to a point 3.3 miles from the Plaque. Here we took the trail up Shoal Creek (see T.V.A. Hightower Bald sheet). We followed this trail up to the old "Bald Field", where we found the remains of an old dwelling in the form of a pile of rocks left from the chimney; also at this place a very bold, cold spring of pure water rises. The miners brought amethyst down to the spring for sorting. We picked up many pieces around the old chimney site and in the stream from the spring.

The summit of Hightower Bald in Union County is less than .2 mile due south of the North Carolina state line at Montgomery Corner. The old Garrett amethyst mine is on a ridge between Shoal Branch and Jack's Branch at Hightower Creek about .9 mile south of the Bald, and in the National Forest.

Dick Smith visited the property Feb. 8, 1934, and left a record of it in the files of the Geological Survey. He wrote: "Amethyst has been mined at various times from a 'lead' or vein striking N. 52°W. The amethysts are found in pockets, locally three inches across and three or four feet long, containing up to 100 pounds of amethysts. The vein then probably pinches for five or six feet and then widens into another pocket. The amethysts are said to be covered with a soft black dust which rubs off easily. Little or no white quartz is showing. Some of the amethysts grade into smoky quartz. Many of the crystals are terminated." The property was worked by Fowler Ledford, an old North Carolina miner, years ago.

A trail leads off east from the spring up the ridge to the old diggins on top and toward the side. Several inclined pits, now mostly filled, were put down on the vein. We picked up a lot of broken amethyst crystals and some perfect ones on the dumps, Sam discovering the best as usual. The color is deep.

Workings were entirely in soft ground; thus by scraping off the upper 15 or 20 feet along the vein and pushing the dirt down the hill, mining could be resumed by open cut methods. The undertaking would be an interesting one, and undoubtedly good amethyst would be obtained, but the geologist cannot guarantee that enough would be gotten to pay for the cost of operation. If the vein continues southeast, it should cross Jack's Branch. Mr. Ledford told Dick Smith that he had found some amethyst on the surface of the ground in the valley of Jack's Branch on a continuation of this vein. Also, it is locally reported that good amethyst is found at the surface on the Hart Eller place, now owned by Richard Eller who lives on the main road near the State Plaque. A. S. F.

RAMBLINGS OF A ROCKHOUND

By R. F. HENLEY
4075 19th Street, San Francisco 14, Calif.

On October 11, 1947, Mr. Orlin J. Bell and I started for the Monterey coast in California to look for jade. We stayed three days and were successful. I was the luckier as I found a block weighing approximately 40 pounds; at any rate 12 inches in diameter and from 1½ to 4 inches thick. Of course it was not the kind that comes from Asia and sells for say $300 an ounce, but still it had some good spots. Near the mouth of Willow Creek we also found some good cabinet specimens of aragonite which fluoresces a bit. (Jade in California, by R. F. Henley, *Rocks and Minerals,* Dec. 1947, pp. 1114-1115).

On October 15, I started for Trona, California to attend and also exhibit at the annual show of the Searles Lake Mineral Society. Besides being the principal speaker at the banquet, I had the distinction of having traveled the greatest distance to attend the show. I was awarded the second prize for cabochon display and took part in three field trips. On the first trip we went north to search for aragonite, which fluoresces well. The second trip was to two of the mines in the Slate Range. We started at 11:00 p.m. (after the banquet), taking our Mineralites to look for fluorescent minerals. It was startling to see the great piles of rocks, so drab by daylight, fairly glowing in the dark. One of the mines was the Ophir—I do not remember the name of the other. We obtained some hydrozincite, which glows a bright blue, and calcite with pyrolusite, which glows like coals of fire. The third trip was to Black Mountain near Randsburg, Calif., where we found ribbon jasper. At Randsburg I secured a piece of rhodonite with that watermelon-red which looks so well in jewelry. It comes from some nearby location which the person from whom I secured it would not disclose This trip consumed six days.

On November 28, Clarence Crane and I, with jeep and trailer, started for the Idria District in San Benito County, Calif. We stayed that night at the Aurora Mine, which is idle, apparently for good, and so were able to put up for the night in an unoccupied cabin. The two Mexicans who were apparently acting as caretakers and also doing a bit of mining were quite hospitable. We found some silicified serpentine, which makes fine cabochons, and which has been given two different names by men who have tried unsuccessfully to exploit it. The names I am not quoting as I do not believe they are authentic. I also found a block with stringers of cinnabar and spots of calcite. On placing it under the Mineralite, on my return home, I was delighted to find it fluoresced a bright yellow and phosphoresced a bright green. The promptness with which it responded to the light and the way the afterglow held on was very pleasing—I am sorry I did not find more of it.

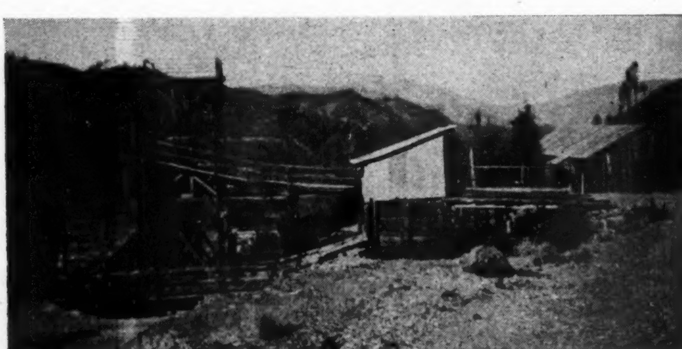
Leaving this district we made a long jump to the Guadalupe Quicksilver Mine in Santa Clara County, Calif. There we secured all we wanted to load up of dolomite with fluorescent calcite in wide crystalline bands. Several years ago I was there with Mr. T. Orchard Lisle, when we obtained some very unusual and finely banded material (see *Rocks and Minerals*. Nov. 1944, pp. 346-347), but it was only found on one boulder and whatever we left has since been chiseled away by others, so there was no more to be found. Some fine dolomite and chalcedony was also obtained at this mine in the past, but these too had disappeared. Apparently some of the dumps were scooped up and put through the retorts during the war when quicksilver was at a peak price.

On January 25, 1948, I went to the Mirabel Quicksilver Mine near Middletown in Lake County, Calif., to secure more fluorescent dolomite containing cinnabar and sometimes a bit of curtisite. This mine also is dismantled and may never be operated again. There is, however, plenty of material on the dumps for collectors. Sometimes it contains little pockets of a honey colored hydrocarbon

"Setting the table" with minerals to be auctioned. Field trip of East Bay Mineral Society to New Guadalupe Quicksilver Mine, Santa Clara County, California, March 7, 1948.

which, when the rock is broken open, spreads over the surface and fluoresces a very bright yellow. (See articles by T. Orchard Lisle in *Rocks and Minerals* for July 1945, pp. 313-315, and July 1947, pp. 610-617). Here I spent the night in an unoccupied cabin. A cold wind was blowing and there was a clatter all night long from loose boards and sheets of corrugated iron flapping in the wind.

I was told of a farm about five miles beyond Middletown, the exact location of which I think I should not disclose, where I could obtain some quartz crystals, locally known as "Lake County Diamonds". By exploring in the walnut orchard I secured a number of the crystals and before leaving the farmer gave me half a dozen much larger than any I had been able to find. He said that some time previous his wife had taken to the local grange a bowl with lily bulbs held in place and surrounded by these crystals! How happy they would have made some rockhound! A peculiar thing about these crystals is that, instead of being hexagonal as all quartz crystals should be, they are all broken up and look like broken ice, with no sharp edges



View of the Mirabel Quicksilver Mine, Middletown, California. The rock pile shown is a good source of fluorescent dolomite with cinnabar, and pockets of hydro carbon, as well as other minerals.

or conchoidal fractures. The geologists are not able to account satisfactorily for this condition and say the crystals are out of place geologically. This is a volcanic area and it may be that the material in which they are found was forced up from below through a quartz-bearing formation. I have had several of them faceted and they make attractive ring stones.

On March 7, I piloted a caravan of forty cars from the East Bay Mineral Society of Oakland to the Guadalupe Mine mentioned above. After they had collected what they wanted, we went on to the famous deposit of orbicular jasper at Morgan Hill, Santa Clara County, Calif. This place is forbidden ground, but I had gone down there a couple of weeks before and secured permission from the owners (Grape Gold Winery) for our group to make the trip. A few cabochons which I took with me helped to smooth the way, and Mrs. Twight, wife of the manager, will be wearing a pendant made from the stone from their property. A barbed wire fence runs through the favorite hunting ground, which is a ledge in the side of the ridge. When our party arrived we found a caravan from Lodi, California, already hard at work on the other side of the fence, having obtained permission from the other property owner, who was out there having a good time watching the rockhounds at work.

Some neighbor, seeing the large gang at work, telephoned the sheriff and he came out with an assistant to see what was going on. He was assured that we had permission but as I had already departed and was the only one who knew exactly who gave it, they were unable to tell him. However he accepted their word and turned to leave and promptly got his car in a chuck hole in the gravel of the dry creek bed and some of the boys had to lift it out bodily so he could proceed. The moral is, do not go there without permission.

On leaving Morgan Hill I went on southwest to Salinas, Calif., where I had an invitation to spend the night with Mr. and Mrs. W. O. Eddy, charter president of the Monterey Bay Mineral Society. I stayed four nights Monday night being the monthly meeting night of their society, I was asked to remain over. Then on Tuesday Mr. Eddy and I went on down the Monterey, Calif. coast on a jade hunt. (See my article in December 1947 of *Rocks and Minerals*, pp. 1114-1115). We went to a different location, where I secured 50 pounds and had to scramble up a steep 200-foot cliff with those rocks over my shoulder and a four-pound sledge which I used as a staff.

On Wednesday I went south to visit Mr. Leo L. Ferris at Stone Canyon (post office address, San Miguel, Calif.) Mr.

Inspecting the "loot". Field trip of East Bay Mineral Society, Oakland, California, to Morgan Hill for orbicular jasper.

Ferris deals in that beautiful brecciated jasper which makes fine cabochons, and also spheres up to 12 or 14 inches in diameter. While there are, I believe, places where one can collect jasper, Mr. Ferris' stock comes from his own land and I contented myself with purchasing what I wanted and doing a bit of trading. Mr. Ferris is building a new house and outbuildings about two miles nearer the county road than his present dwelling and I was the first guest to spend the night in the new "guest house"—a nice little one-room affair as neat as any auto camp.

Mr. Ferris presented me with something which I prize very highly; a cabochon made from a chip of fused quartz from the making of the 200 inch telescope now being installed at Palomar, California, and of which we have read so much for a number of years past. It has a bluish cast and a sheen that is almost iridescent.

Just to finish the trip I stopped at Gilroy, Calif., on the way home and did a little swapping with Jack Martin, who runs "Martin's Mineral Mart" at the north end of town. I fear I will not live long enough to cut up all the rocks I secured, together with the pile already in my shop.

THE GERHARDT PYROPHYLLITE DEPOSIT

By C. HENRY KING
Franklinville, N. C.

The Gerhardt pyrophyllite deposit is located approximately four miles west of Staley, Randolph County, North Carolina. It may be reached via a network of several dirt roads which are yearly traversible except in prolonged periods of wet weather.

Locally this is known as the "soapstone mine". Although an erroneous term, it is not to be accredited to the uninitiated alone, because even us amateur collectors are known to use the misnomer. Distinguishing between compact talc (soapstone) and compact pyrophyllite is a matter of chemical analysis.

On brink of pit looking across to cliff. Note size of people on top of cliff.

The deposit is in that portion of the piedmont plateau known as the 'Carolina Slate Belt' (a term loosely used to cover the volcanic and sedimentary rocks of this region) and occurs specifically in the acid volcanic tuff.

The site under discussion is not mentioned by Pratt[1] possibly because it was not being commercially exploited at the time or was relatively insignificant in comparison with the extensive Deep River Pyrophyllite Area in the adjacent counties of Moore and Chatham.

A much later report by Stuckey[2] describes the Gerhardt deposit and in part says: [it] . . . "appears to be one of the most important undeveloped deposits in the state."

An article on pyrophyllite in *Rocks and Minerals*[3] also mentions the deposit and was the prime mover' that prompted the writer, his wife, Mr William Frazier, and Miss Barbara Padgett to spend several hours there on the afternoon of Sunday, April 18, 1948.

The virgin mineral bed was characterized by a knoll approximately 200 feet

above the surrounding terrain. The present conditions are that this knoll has been mined away on one side leaving a bold cliff that can easily be seen from long distances because of the light color. The cliff is further accentuated by an open pit at its base which is about 30 feet deep and 45 feet in diameter. This pit is the present area being excavated and is entered by a road that has been cut through the profile starting at a point low enough to meet the present level of the pit. The road is tunneled for several feet just before entering the excavation.

Among the minerals found at the mine are:

Pyrophyllite: occurs massive, flake, and as very fine radiating fibrous masses white to buff, occasionally green, and sometimes stained brown or red from iron oxides.

Pyrite: massive and as minute cubes.

Chalcopyrite: very small masses and as stains.

Hematite: small black masses in cavities and as red stains on pyrophyllite.

Limonite: occasionally as short stalactitic masses covered with yellow ocher, more commonly as stains on pyrophyllite.

Quartz: milky masses in impure zones with pyrite and chalcopyrite.

Sericite: occurs as small flakes with pyrophyllite in the more highly silicified rock.

Chloritoid: reported by Stuckey[2].

The writer is indebted to the Division of Mineral Resources, North Carolina Department of Conservation and Development for re-identification of the chalcopyrite, sericite and hematite all of which occurred in small amounts. Thanks is extended to Mr. William Frazier for transportation to and from the mine.

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1. Pratt, Joseph Hyde—Talc and Pyrophyllite Deposits in North Carolina. Economic papers No. 3 N. C. Geological Survey 1900.
2. Stuckey, Jasper L.—The Pyrophyllite Deposits of N. C. Bulletin No. 37. N. C. Dept. of Conservation and development. 1928.
3. (Zodac, Peter) — Pyrophyllite. *Rocks and Minerals.* Vol. 23, No. 1. Jan. 48. pg. 33.

Road cut through profile and tunneled to meet pit at base of cliff. Those in the picture are Miss Padgett, Mr. Frazier, Author's son and wife.

A REPORT ON UNUSUAL LIMONITE FORMS FROM VAN BUREN COUNTY, MICHIGAN

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In Collaboration with Harvey Franz, 1027 Ogden Ave., Benton Harbor, Mich.

ABSTRACT

Upon the basis of an incomplete study of certain root-shaped limonite forms from limonitic sand areas of Van Buren Co., Michigan, these appear to be of ancient fulguritic origin. Several reasons are given for this, and a plan for further determinitive study is indicated.

LOCALITY AND OCCURRENCE

Superficial streaks of deep-red limonitic sand several square rods in area producing remarkable limonite forms are found in the quartz sand blowout areas of the southeast shore of Lake Michigan. One specific area—the most productive but otherwise typical (figure 1)—is located four and one-half miles directly south of South Haven, Van Buren Co., Michigan, two miles from the present south shoreline of Lake Michigan in an area covered by the lake in past glacial ages, now some 80 feet above the lake level at an elevation of 660 feet.[1] This particular streak of limonitic sand is 120 x 10 to 40 feet in size. Such areas are slightly more resistant to erosion than the surrounding clean quartz sand, which is inclined to shift, leaving semi-solid lumps of limonitic sand exposed.

Root-shaped, hollow limonite forms of several inches in length are found in these areas and also scattered in the surrounding clean quartz sand. The density of occurrence of worthwhile specimens is often two or three to a square foot and the ground is littered with small fragmentary pieces. *In situ* shafts project slightly above the ground but descend to a depth of only a few inches.

The present day quartz sand deposits of the Lake Michigan area are estimated to be about 100,000 years old,[2] and some areas of sand contain iron in the form of "bog iron" masses and (near the shoreline) fine magnetite grains sorted with the quartz sand. Because of their inland location and their thoroughly oxide-altered nature, it is reasonable to assume that the limonite deposits are older and

1. U. S. Geological Survey Topographic Map: South Haven, Michigan, Quadrant; location approximately 20 rods east of center of Sec. 3-T2S-R17W.

2. Frederick Shepherd, "The Story of the Dunes," *Rocks and Minerals*, Vol. 7, No. 2 (June 1932), p. 41.

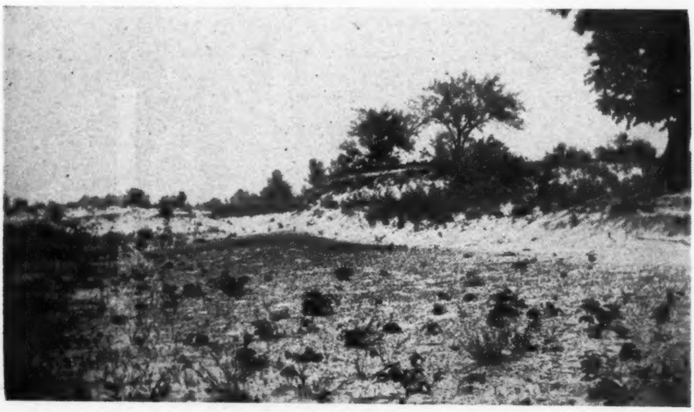


Figure 1. View of typical limonite area, showing the sand floor strewn with fragments (grayed area). Looking north.

more static than the other more transitory iron deposits, but not quite so old as the quartz sand deposits, since the limonite areas exist as distinct formations within them.

While the above account of the limonitic areas is sketchy, it is doubtful whether further pursuit would be of any value in this study.

DESCRIPTION OF SPECIMENS

Figure 2 shows a collection of representative, hollow, cylindrical limonite forms several inches in length mostly taken from the specific locality defined above. *Their shape and mode of occurrence suggest both concretions*[3] *and fulgurites.*[4] Some are extremely weathered, abraded and broken, even upon unexposed surfaces, by rain, freeze, and thaw, particularly severe in this lake region. Their dark rust color, opaqueness, and yellow-brown streak are typical of limonite; also H. = 5—5.5, G. = 3.6—4.0. The outer surface is dull and earthy with loosely cemented small limonite grains adhering. The interior surface (the bore walls) is nearly black in color, submetallic in luster, and several degrees harder than the exterior. The relative proportions of wall thickness to diameter and bore are about the same for all sizes, and are shown in figure 3A. However, the bores of some specimens were completely filled with quartz sand and limonitic sand, and some (especially those specimens of small exterior diameter) were found to be solid limonite shafts when broken, with occasionally a dark, hard submetallic core.

Many specimens show branches and protrusions, and distortions are common (figure 2). Some small-diameter shafts taper to a point.

3. In this incidence: stalactite forms as a result of cementation by percolating, mineral-bearing waters.

4. In this incidence: cylindrical shafts fused of sand by the action of lightning.

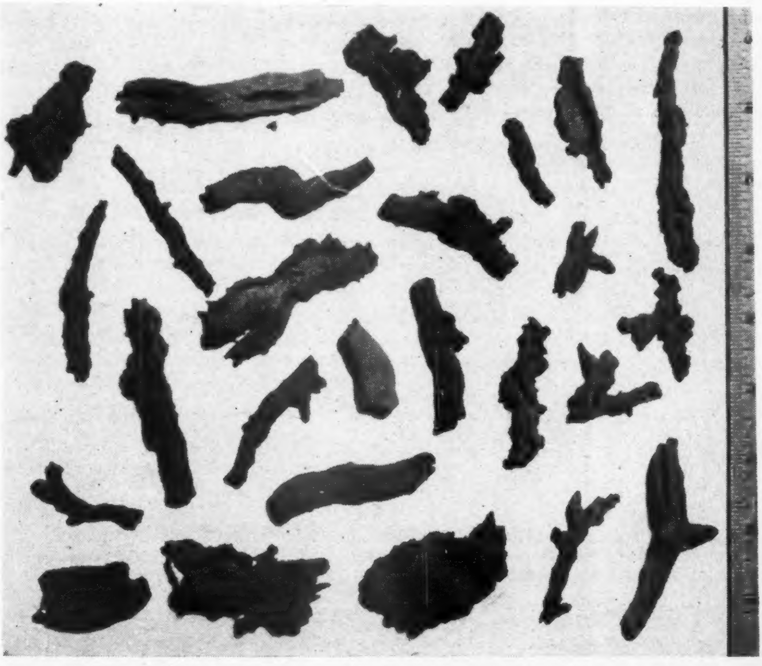


Figure 2. Typical limonite specimens postulated by the writers to be of fulguritic origin.

An as yet unexplained characteristic of virtually all specimens is a crease running longitudinally often the full length of the specimen (see cross section A, figure 3). Weathering of shafts produces forms B and eventually C.

CHEMISTRY

Limonite is largely $FeO(OH).nH_2O$ with some $Fe_2O_3.nH_2O$. It is perhaps an amorphous form of goethite with absorbed and capillary water.

Typical specimens of the Van Buren occurrence were emersed in concentrated hydrochloric acid for a week. They bleached to a light gray color as the iron oxide dissolved into the acid, coloring the acid a deep rust brown. The forms became a gel which was too soft to be removed from the flask after the acid was carefully drained off—only a few specimens retained their shape. These were carefully soaked in a slow rinse of water for several days and then dried. Having no iron oxide or gel binder, the dried forms crumbled at the slightest touch. Apparently the silica content of the material was in a hydrated form (hyalite?) which was reduced to a gel in the acid. No heat-fused silica or glasses were found in the framework of the several pounds of material thus exmined, although there was considerable quartz sand grain residue. A few shapeless, soft, "bog-iron" masses (found near the tube forms in the limonitic sand area) which were emersed revealed several dark spots after bleaching. Under the lens these spots proved to be bits of lignite.

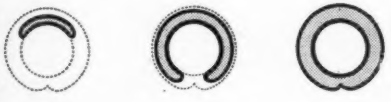


Figure 3. Cross sections of shafts in diagram, showing longitudinal crease and progressive stages of weathering.

ORIGIN

The only two possible origins of these limonite forms are *concretionary* and *fulguritic,* and since it is implausible that both could be responsible, one must be chosen and the other discarded. Those geologists, mineralogists and chemists who have examined these specimens cognizant of the preceding details of occurrence are about equally divided in their opinions of the origin.

In favor of the concretionary origin: limonite concretions are common occurrences and are even anticipated in just such areas of dense limonitic sand; lime concretions are even found in several places in the dune region. Also, no fused silica or glass, almost invariably a constituent of fulgurites, was found in these limonite forms. These are the only two arguments in favor of a concretionary origin and the latter may be of no value, but the former simple argument carries considerable weight.

On the other hand, arguments in favor of a fulguritic origin are involved and difficult to explain, but, in the opinion of the writers, are more convincing than the concretion hypothesis. First, authentic fulgurites composed of limonite and of ancient origin have been found in several localities,[5] which fact confirms the possibility of this mode of origin. Moreover, authentic fulgurites have been found with only microscopic inclusions of fused silica (lechatelierite) in their almost granular makeup.[6] The Van Buren specimens were not examined microscopically for this.

While a reasonable doubt of their fulguritic origin exists, the likelihood of this origin is borne out by several facts which appear to have no other explanation. The surrounding and neighboring clean quartz sand blowout areas contain a (relative) abundance of sand fulgurites,[7] and it

5. A part-limonite fulgurite of Cretaceous age is described by W. L. Barrows, "A Fulgurite from the Raritan Sands of New Jersey. . . .," *School of Mines Quarterly* (Columbia Univ.), Vol. XXXI, No. 4, (July 1910), pp. 294-319.

6. A. F. Rogers, "Sand Fulgurites with Enclosed Lechatelierite from Riverside Co., Calif.," *Journal of Geology,* Vol. LIV, No. 2 (March 1946), pp. 117-122.

7. Harvey Franz, "Fulgurites in Michigan," *Rocks and Minerals,* Vol. 21, No. 6 (June 1946), pp. 354-355.

would have to be explained why fulgurites would not exist also in the limonite areas, since these areas occupy a space which would ordinarily bear several fulgurites. Moreover, lightning would be somewhat attracted to these irony areas, and one would therefore expect to find a concentration of fulgurites there. This is consistent with observation.

If lightning is attracted to these spots it must then follow that the immediately surrounding quartz sand areas would be deprived of lightning strokes. This is another hypothesis consistent with observation—no sand fulgurites are found within a 100-foot radius of these limonitic areas, a total circumscribed area which would normally yield a number of shafts.

The tendency of the shafts to branch and to be distorted could perhaps be due to the shallowness of the limonitic sand where the electrical current would be grounded or dissipated horizontally instead of vertically, as in the case of sand fulgurites which penetrate downward to mineral ground-water where the current is finally dispersed. Since limonite is considered to be a better electrical conductor than silica, one would not expect the shafts or branches to extend through into the silica in many incidences, but rather to dissipate entirely in the shallow confines of the limonitic area. This would not only account for frequent branching and distortions, but also for the abundance of specimens.

Another factor contributing to an abundance of the limonite specimens is the semi-solidity of the limonitic sand, which is such that it remains more or less stationary, while the surrounding clean quartz sand is inclined to shift with the winds, as stated earlier. Sand tubes are quickly exposed to the severe weathering agent of blowing quartz sand and are quickly disintegrated; the limonite forms remain preserved under the more cohesive limonitic sand for a much longer time, and when eventually exposed, are not reached by the full force of the blowing sand.

Assuming for purposes of discussion a fulguritic origin, another factor which could account for the greater number of limonite shafts than sand shafts is the lower fusing point of limonite, 1300+° C., as compared with an estimated 1470° C. for quartz. To pursue this point the nature of lightning must be reviewed in part. During the seconds preceding a lightning flash, the negative cloud charge often attracts "feelers" of current from the earth's positive charge which rise from the ground, sometimes visibly, several feet into the air. These are called leader currents, and their strength of charge is reckoned at 1/10 coulomb[8] or less. While not hot enough to fuse silica, leader currents in their brief seconds of existence may conceivably be hot enough to fuse limonite. If so, then one may expect more fulgurite shafts per unit area of limonitic sand than quartz sand.

The abundance of limonitic forms may be accounted for by any one of the above hypotheses or by any combination of them —since they are so closely related, one could scarcely be considered more valid than another. These points would seem to the writers coincidentally to confirm a fulguritic origin, also.

RÉSUMÉ AND PLAN FOR PROJECTED STUDY

While the writers have offered both observation and deduction indicating a fulguritic origin of the limonite forms, several factors need be cleared before the case is closed. First, an explanation is needed for the longitudinal crease shown in figure 3. Such an explanation would undoubtedly give conclusive evidence of the origin of the limonite forms themselves. Second, solid shaft forms must be explained in order to determine if they are a result of filling-in or if initially formed solid. Sand fulgurites are always either hollow or collapsed hollow tubes, or the bore is in the form of a highly

8. A coulomb represents the amount of electrical charge transferred in 1 second by a current of 1 volt; it is estimated that a charge of at least one coulomb is necessary to fuse quartz sand.

vescicular and porous center—in no case are they ever formed solid.

Third, microscopic examinations of thin sections would reveal lechatelierite, cristobalite, tridymite, and other fusion minerals, if present. Fourth, it is reasonable to assume that leader currents alone would not be responsible for all the limonite forms if of fulguritic origin, that at least some forms would have a framework of fused silica—that is, would be formed by the main lightning stroke, which would be sufficiently hot to fuse the disseminated quartz grains. More material must be acid tested for this.

Fifth, the locality must be examined more thoroughly for exceptions to the two suppositions: that shafts and branches of limonite would not extend into the quartz sand to produce "half and half" specimens; that sand fulgurites would not be formed near these limonitic areas.

Sixth, the fact that limonitic sand is any sort of electrical conductor and that limonitic sand areas might attract electrical discharges requires laboratory proof even though these facts are widely accepted. Laboratory tests would also be required to ascertain if leader current charges would be sufficient to fuse limonite particles.

As stated in the abstract, this report is not complete. Some of the problems presented above would require facilities which the mineralogical profession does not have at its disposal, but the solution to others of these problems, just as important, will be undertaken soon and, if indicative of the origin of these forms, will be presented in these pages. The justification for publishing this incomplete report is not only to divide into two parts what would be a very lengthy paper when complete, but also to show the uniqueness of the problem as it stands at this writing.

HUGE ORE DISCOVERY IN CANADA

North Shore Find May Prove World's Largest Titanium Deposit

(Ore is Ilmenite with Intergrowth of Hematite)

QUEBEC, Aug. 14—(C.P.)—Premier Duplessis yesterday announced discovery in Eastern Quebec of what may be the world's largest deposit of titanium ore and disclosed plans for a $25,000,000 project to develop it.

The ore, which is refined into a metal for high-grade alloys and pigments for paints, was discovered near Lake Allard, 400 miles northeast of Quebec City.

Railway To Be Built

Kennco Exploration Limited, operating under a license from the Quebec Government, will build a 27-mile railway from the north shore of the Gulf of St. Lawrence into the mineral area, said the Premier at a press conference.

The Premier made the announcement at a time when other exploration companies are seeking the limits of iron ore deposits farther north. These iron ore deposits may even surpass in extent and quality those of the great Mesabi range in Minnesota, source of iron ore for the blast furnaces of the United States midwest.

Cost of the railroad was estimated at $10,000,000. He said the company will also build a refinery at Sorel, Que., to treat the ore electrolytically at a cost estimated between $12,000,000 and$15,000,000.

The Premier figured that the total expenditure in developing the deposit will have run into $150,000,000 and will eventually require a minimum of 500,000 electrical horsepower.

Experts of the company, a subsidiary of Kennecott Copper Corporation, had told him the Eastern Quebec deposits are the world's largest.

Threat to India Monopoly

He predicted that the deposits would eventually break the monopoly that India holds on the mineral.

Titanium, he said, has many uses. It is used in paints and mixed with other elements produces a metal as strong as high grade steel.

The deposits were found in Tetu county on the shores of Tio Lake, one of many small lakes which encircle Lake Allard, 27 miles inland from Havre St. Pierre on the north shore of the Gulf of St. Lawrence.

"The explorations were made by the Kennco Exploration Limited, a subsidiary of the Kennecott Copper Corporation, the world's biggest copper producer," the Premier added. "Mine claims were granted by the government according to the mining laws of the Province of Quebec.

"The results of the company's prospecting are that there are in that region millions of tons of titanium of commercial quality."

The Premier said that during the week he had met R. J. Parker, vice-president of Kennecott Copper, who had told him that the corporation would immediately begin construction of the railroad.

Province to Benefit

"This is a project of around $25,000,000 Mr. Duplessis said, " and it is just a small beginning of gigantic developments of which the province and more particularly the Saguenay County will benefit."

He said the project will bring new industries into Saguenay, Richelieu and St. Maurice counties.

"After projected developments," the Premier said, "the province will become a metallurgical centre most important in Canada and probably in the whole world."

"Mr. Parker told me that with the realization of this project the province will benefit by an industrial development amounting, in salaries and revenues paid the government, to hundreds of thousands (of dollars)."

He said the establishment of the industry proves that the province must remain mistress of its own destiny.

He referred to his Government's victory in last month's provincial elections when he said "the people of Quebec were right on July 28 to express their will to live and survive."

Ottawa Confirms Find Of Valuable Metal

OTTAWA, Aug. 14—(C.P.)—A Government mines authority last night confirmed that possibly the world's greatest deposit of titanium ore has been located in the Lake Allard district, 400 miles northeast of Quebec City.

The authority said the discovery—announced last night by Premier Maurice Duplessis—would have a tremendous influence on Canada's mineral future and ranked it in the same class " as the discovery of gold."

He said titanium metal, used principally in the manufacture of pigments for paints, had "many unknown qualities" which many lead to its use in other fields.

Its discovery in Canada will no longer make it necessary for the Dominion to import some $4,000,000 worth of the mineral from India each year.

The discovery first was made, said the spokesman, by a group of Canadian engineers looking for copper in 1946. The Government Mines Bureau in Ottawa assisted in tests of the ore and found it of high mineral content. Investigation was continued over the last two years.

He confirmed that Kennco Exploration Limited, a subsidiary of the American-owned Kennecott Copper Corporation, had control of the deposits and were proceeding in its development.

"The company expects to break ground early next spring," said the authority, and added: "biggest drawback, of course, is a requirement of some $30,000,000 to build the necessary plants and purchase equipment."

The spokesman did not believe the Government would assist in the development of the deposit other than through allowing the use of Mines Bureau equipment at Ottawa.

—The Montreal Daily Star, Saturday, August 21, 1948.

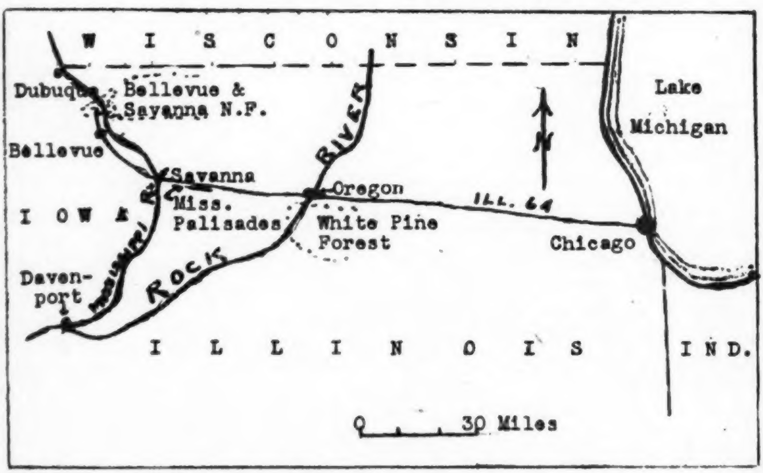
"AGATE HUNTING TRIP TO BELLEVUE, IOWA, AUGUST, 1947"

By HELEN KENNEDY
Member of the Humboldt Park Lapidary Shop, Chicago, Illinois

Interesting and varied specimens of agates can be found in the gravel pits (glacial deposits) near the Mississippi River, two miles north of Bellevue, Iowa. Gravel pits are privately owned and operated and permission should be obtained before entering premises. Glacial deposit is dug up and sand sifted from the rocks. Then the larger rocks are segregated from smaller sized ones. The mounds of rocks form small hills and one can spend all day enthusiastically searching for agates—up one side and down another and even sitting on top of the hill of rocks. Placing your eyes down close to the side of the hill of rocks and looking upward to top of mound, makes it easier to distinguish the agates from ordinary rocks, especially with the sun shining through the outer edges of the agate.

You can also hunt for agates from the source direct, that is, the glacial deposit as it is still in the ground. Just climb down inside one of these immense pits dug out by the large shovels. Here too you can spend all day searching all the sides of the pits. No need to dig hard because the sand is the main constituent of the glacial drift and your "find" is easily dislodged. Most of this material was formed during the glacial period when glaciers melted away, thousands of years ago, leaving behind glacial drift, which in this particular area consists of pebbly clay, sand, gravel, rocks and boulders.

These agates are easy to work with. They do not break or crack easily and take an excellent polish. They are usually banded or striped in pleasing and intricate patterns, sometimes forming circles and even an eye. An Eye Agate is a find. It is possible to find almost anything in these glacial deposits, even amethyst crystals, but agates predominate. Colors range from pure white to beige, brown, gray, and some with orange and reddish streaks. A Waterfall Agate is really THE agate to find, with its shimmering moving light that is apparent when the polished agate is moved around. Dark red translucent carnelian pebbles, white to brownish chalcedony pebbles, and dark red jasper pebbles are also found.



Sketch map showing location of Bellevue, Iowa

The distance is about 175 miles from Chicago on excellent paved highway, No. 64. After crossing the Mississippi River, branch off on dirt road, No. 52, also in good condition and travel for 20 miles straight into Bellevue, Iowa. Register at the one hotel there, on main highway. It is clean and comfortable, serving excellent meals at reasonable prices.

Points of interest along the route can be explored: White Pines Forest is located nine miles west of Oregon, Illinois, and was recently made into a state park containing the last white pines left in Illinois. Few trees are more beautiful. Other points of interest are the Mississippi Palisades, U. S. Fisheries near Bellevue, Savanna National Forest, etc.

Then too, the last half of the trip to Bellevue is across picturesque Rock River Country of northern Illinois. The Rock River runs for the most part over gravelly bottom. Below Camp Grant, where this river swings to southwest, the river valley is narrow and its sides steep. High clifls alternate with low rounded hills and narrow gorges and deep ravines with open valleys. Little wonder that this portion of Rock River is known as the "Hudson of the West". Region stimulates interest and imagination. For the most part the upland of Rock River is covered with glacial drift and is gently rolling. Glacial drift varies in thickness from few feet to more than a hundred feet. Three kinds of rock in Rock River Country: sandstone, limestone and shale. Rocks are made up of particles of ancient sediment of one kind or another, closely packed and firmly cemented, which is why they are called sedimentary rocks. Many homes and rock gardens in northern Illinois are made from colorful boulders from glacial deposits.

Lock and Dam No. 12 on Mississippi River at Bellevue, Iowa, in the background.— That's "me" in the foreground, says the the author.

REFERENCE

State Geological Survey, Circular 124, 1946. Illinois Geological Survey, Urbana, Ill.

Some members of the Humboldt Park Lapidary Shop collecting agates at Bellevue, Iowa. The group journeyed to the locality in a caravan of cars, guided by Mr. Ray Mitchell, their instructor (well liked by all), who patiently showed the many rank amateurs exactly how to look for what and where.

"JACK-HAMMER VIRGINIA" MINER AND TRUCK DRIVER AT A BERYL MINE

For Two Years An Attractive 21-Year Old Blonde Has Been Doing A Miner's Chore on A New Hampshire Mountain.

By T. ORCHARD LISLE
480 Lexington Avenue, New York 17, N. Y.

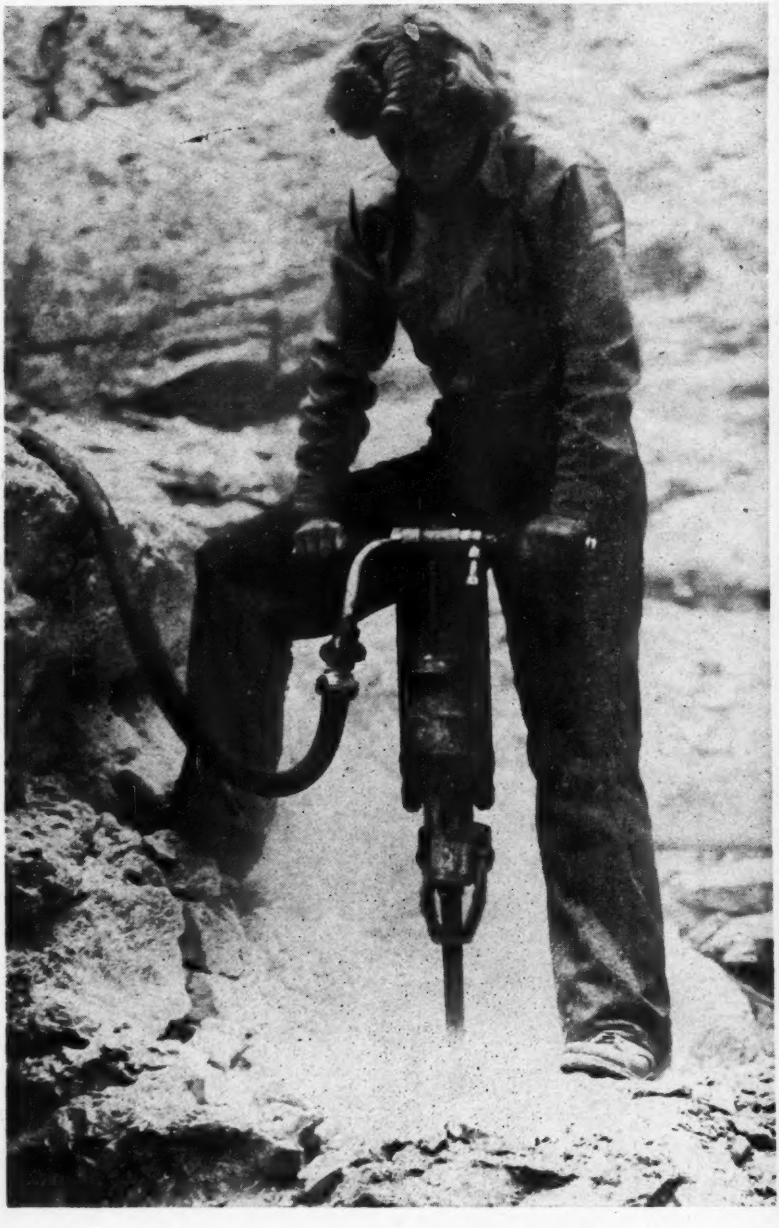
I came across "Jack-hammer Virginia" unexpectedly this summer when searching the dumps at the Palermo mine, Bald Mountain, New Hampshire, for aquamarine and other gem beryl. After watching her work I decided that there was a story to be told. We itinerant rockhounds break rocks for a hobby, but it is a living for Virginia, and she more than earns her pay—the hard way. Her real name is Virginia Harriman, and she lives in nearby West Rumney. As one of her several jobs she drives a five-ton truck up-and-down the very steep and unpaved road leading to the mine. It is steep enough to cause the radiator of our car to boil on a moderately cool day.

Virginia is young, blonde, intelligent and beautiful. Truck driving is only part of her regular work. She fills in the rest of her eight-hour day drilling holes in the hard pegmatic rock with a pneumatic jack-hammer for the dynamiting blast charge, and wedging-up large boulders with a six-foot crowbar, and is not above using a heavy sledge hammer to crack out

"Jack-hammer" Virginia Harriman does the same work as the other miners. (When I was looking into the viewfinder of the camera, I think the foreman playfully "lashed" at her with a piece of rubber hose.)

(Photo by the Author)

"Jack-hammer" Virginia Harriman thinks nothing of moving heavy boulders with a crowbar.
(*Photo by the Author*)



Using a jack-hammer is a he-man's job, but is everyday work to Virginia Harriman.
(*Photo by the Author*)

"Jack-hammer" Virginia Harriman, truck driver and miner.
(*Photo by the Author*)

the beryl crystals from the matrix. Not only does she accomplish as much as the huskier male miners, but they like it and her. In fact, she is as popular with the mine gang as she is with the boys of her village, which is saying something. The accompanying pictures are not "staged"; Virginia was just hard at work, although she did consent to stand still a moment alongside her truck.

It is an every day job for her, and she seems fond of the hard outdoor work. Only surface mining is being carried on at present, as the rich ore has been taken out during past years from the underground workings.

Virginia lives at the little village of West Rumney, N. H., where she is to be seen flashing-by in her convertible in feminine garb, when not at the mine. She is no man-like husky girl, but a dainty slim 5 ft. 3. in., and essentially feminine from her blonde curls to the soles of her heavy work shoes, and one wonders where all her strength comes from. On duty she dresses sensibly in a tan shirt and trousers; but does not appear to wear gloves, although, as I found out, it is very easy to get cut by the fragments of sharp glassy quartz that composes some of the rock in which the ore is found. Virginia attacks her job with unbounded enthusiasm, and her natural sun-bronzed complexion is free from artificial aids.

The products of the mine are fascinating to "rock-hounds", as amateur mineral

A group of beryl crystals in the rock at the Palermo mine.
(*Photo by the Author*)

collectors are called. Beryl and feldspar are mined at the Palermo mine. The greenish blue and golden beryl crystals, hexagon in shape, range from an inch to several feet long. Beryllium is obtained from the ore and used in manufacturing copper and steel, or goes to the Government's stockpile of strategic minerals.

Some of the beryl from the Palermo mine is of gem quality; this is the clear and brilliant stone from which aquamarines are cut. The lovely gemstone helidor is cut from the golden beryl. I have one attractive crystal in smoky quartz but it is fractured.

When the beryl crystals are bright green and transparent they are better known as emeralds, beloved of many women. No emeralds, however, come from the Palermo mine, although they are found in the mountains of North Carolina. The finest grass-green emeralds are mined in Colombia, and the next best from Siberia and Egypt. Pink beryl is known as morganite, after the famous gem collector, J. Pierpont Morgan, whose magnificent collection is to be seen in the American Museum of Natural History in New York City.

Golden beryl contains some uranium oxide and is radio-active, and there is a uranium mine at nearby Grafton, N. H. Some of the ore matrix from the Palermo mine contains autunite which is reactive to black (ultra-violet) light, and fluoresces a brilliant green in the dark.

TOPABRI GOLD MINE OF GEORGIA

(Reprinted from Georgia Mineral Society **News Letter**—August 1948)

Our regular July field trip was taken jointly with the G.A.T.C. on the 25th to the old Topabri Mine in Lumpkin County (northern Georgia). Members and guests totaled between 50 and 60. To reach the mine, go to Dawsonville and take the road to Dahlonega. Go 4.4 miles from the courthouse in Dawsonville and turn right on a soil road. Continue straight on that road 3.7 miles, turn to the right on a farm road .3 mile into the property to the tenant house.

This mine is one of the oldest in Lumpkin County, lying about one mile southwest of Auraria, adjacent to the Etowah River on McKlusky Branch. It produced some very large nuggets before the Civil War. W. S. Yeates states that before the Civil War, Mr. John Lilly, with a negro slave, took 1,050 dwt. of gold from an area of auriferous gravel, eight by ten square feet (Bull. 4-A, Ga. Geol. Survey, p. 484).

It is not possible for the group to come back with a very clear conception of the lay-out of a property of this kind without using up much more time than we were able to spend. Below the house on the little stream where we panned, the gold has been worked out and backward from the stream. The gravel ledge from which we obtained samples is a remnant left by the old miners. This gravel ledge at this place consistently gives three or four colors at least, and Mr. Victor T. Johnston plans to hydraulic these gravel remnants at about 90 pounds pressure.

The principal portion of the mining property is in the vicinity of Etowah River, which is reached by continuing on along the road by the house where our cars were parked. The stream upon which we panned, leading down past the pump, flows into another stream, and these waters jointly enter the Etowah. In this locality there is a very large flat which contains a considerable amount of placer gold. The amount produced is not known. but in the old days when it was worked rather carelessly, it was never unusual to clean up a fruit jar full of nuggets at the end of each day. Planned development of this large placer area should result in the production of a considerable amount of gold.

A. S. F.

WHY I LIKE TO BUY FROM DEALERS!

We believe that the finest specimens, the most interesting books, the most desirable equipment and other items prized by collectors are to be obtained, chiefly, from established dealers. If you think so, too, let us hear from you.

Please follow these rules:—

1. Letters not to be over 300 words in length.
2. Typewritten if possible (double space). Head it—Why I like to buy from dealers.
3. Send them to the Editor, Rocks and Minerals, Peekskill, N. Y.

Gifts in the form of minerals or other items will be sent writers of all letters printed.

The following letters were received, recently.

"Why I like to buy from dealers" is self-evident due to the fact that my part of the country has a very limited native deposit of rocks and minerals; so that as one progresses in building up a representative collection, he has little or no opportunity of worth while collecting. The mineral publications, in nearly every issue, report new localities and interesting "Finds" of great value to any collection. How can a person keep up to date and obtain needed specimens? The travel and time required are denied to many of us. The magazines play a very important part in telling us about them, but the actual securing of specimens would be impossible without the dealers.

The dealers maintain contacts with the mines and the professional prospectors who put in long hours of tedious work to obtain the material so that folks like you and I may benefit.

Those of us who have tried prospecting soon learn that the specimens we dig or find are dearly, even though proudly, earned, and we begin to realize that the prices asked by most dealers are not only fair but down right cheap. How would we be able to fill the gaps in our collection or obtain rarities were it not for the dealers who are always ready and willing to assist?

Dealers are as vital to the success of our collections as are the publications that keep us posted. Without them a "beginner" would always remain a "beginner" with small chance of progressing. Often the most beautiful or perfect specimens come from deep down in mines and from almost inaccessible places. The dealers open wide the doors to such treasures.

Show me a "dealer made" collection and I'll gamble it will be a fine one. I claim dealers are a "must".

E. C. Teeter
2000 Peoria Ave.
Peoria, Ill.

"I like to buy from dealers because we meet on common ground. They understand what happens to a person when he catches "rock-hounditis" and offer their whole-hearted interest, sympathy and valuable assistance. No dealer ever thinks a fellow-rockhound is crazy and he knows just what equipment, gadgets, books, and specimens are most likely to alleviate his symptoms.

Another reason of primary importance (to me at least) is certainty of identification. It takes a lot of study and experience before the beginner can be sure of the identity of specimens he has collected in the field, and one of the best ways of acquiring this knowledge is the study of known specimens. Reliable dealers, such as those that use the columns of *Rocks and Minerals,* are the surest source of accurately labelled specimens.

I also like to buy from dealers because their specimens are always clean, in good shape, and usually superior to those I find in the field. This is important to me because my greatest pleasure comes from the sheer beauty of minerals.

For specialists and the ordinary mortal who has no great opportunity for travel, the dealer represents the best and often the only opportunity for rounding out one's collection.

The beginner must never think he has to collect personally every rock and min-

eral in his collection. No one else does, and the finest collections are built up by a combination of field work and some trading, perhaps, but principally by purchasing from dealers.

The thrill that comes from finding a good specimen in some rock dump can hardly be surpassed, but it happens rarely, and besides, I really like to buy from dealers."

David B. Sabine
c/o The Arlington
Chemical Company
26 Vark Street
Yonkers 1, New York.

BIBLIOGRAPHICAL NOTES

Directory of California Federation of Mineralogical Societies, Inc.

Beyond all question of a doubt, the great state of California leads the Union in the number of mineral collectors. *Rocks and Minerals* has its largest circulation in that state, for one thing, and then to settle all arguments, the directory issued by the Federation proves it. For the directory lists 3370 names and addresses of all paid up members of the many clubs and societies that are affiliated with the Federation —there must be many thousands more who are not attached to clubs.

This pocket size directory of 126 pages is a most valuable publication and especially for Californians or those who may travel in that state. Thousands of copies were sold at the recent convention at Long Beach, Calif. (July 16-18th) but there may be a few left. If any are still available they can be obtained from C. A. Noren, Rt. 3, Box 312, Fresno, Calif. (price not quoted).

Catalogue of Topographical Mineralogies and regional bibliographies: by L. J. Spencer, C.B.E., Sc. D., F.R.S., F.R.G.S.

Here is a paper which will meet with the hearty approval of all collectors interested in localities. For it lists (with brief descriptions in some cases) of all important publications which cover minerals and mineral localities of the world. Europe, Asia, Africa, North and South America, Australia, Pacific Ocean, Indian Ocean, Arctic and Antarctica are all covered. Altogether 355 countries (including many states of the United States), islands, and other regions are included. Four articles which appeared in *Rocks and Minerals* are also listed. Unfortunately, quite a number of the publications listed are out of print and so difficult to obtain, while many others are written in the language of the countries whose minerals are described. Some of the countries, like Denmark and Japan, have English translations.

This very important and most valuable catalogue appears in *The Mineralogical Magazine,* June, 1948, Vol. XXVIII, No. 201, pp. 303-332. Issued by The Mineralogical Society, G. F. Claringbull, B.Sc., Ph.D., F.G.S., General Secretary, British Museum (Natural History), Cromwell Road, London, S.W. 7, England. Price per copy 12s net.

The Mining Groups of the Yilgarn Goldfields by R. S. Matheson, B.Sc., with 3 appendices by K. R. Miles, D.Sc., F.G.S.

The geology and mineralogy of the different gold mines located in the goldfield are described. The goldfield is in the southwestern part of Western Australia. 250 pp., 8 figs., 1 map.

Issued by the Geological Survey, Perth, Western Australia.

Gem Stone Lore: by William Poese.

A new and different kind of book and yet a most interesting one is *Gem Stone Lore,* by William Poese, which has just come off the press. In this book, the author not only gives some very valuable information on gems but the unique part is that fascinating stories of "My favorite gem" are told in over 30 actual letters—pictured in full—written to the author by famous Americans—presidents, statesmen, churchmen, actresses and actors, motion picture and radio stars, musical and literary figures, athletes and explorers. President Truman, Robert Taft, Harold Stassen, Helen Hayes, Christopher Morley, Fannie Hurst, J. Edgar Hoover, Father Devine, Gladys Swarthout, Adolphe Menjou—these are only some of the noted people whose interesting letters appear in the book.

Every person interested in gems will find *Gem Stone Lore* really delightful and entertaining and a most welcome addition to his private library. It is 10 x 7 inches in size, contains 56 pages, and is for sale by the publishers, Mineral Book Company, Colorado Springs, Colo. Price $1.75.

NORTH JERSEY MINERALOGISTS ENJOY OUTING AT THE QUARRY OF THE LIMESTONE PRODUCTS CORPORATION, AT SPARTA JUNCTION, N. J.

By KATHERINE BARBARA KAUTH, Publicity Secretary

Clear blue sky and bright sunshine overhead, together with cool and invigorating air, brought joy to the 45 North Jersey Mineralogists and their friends, as they contemplated visiting the quarry of the Limestone Products Corporation at Sparta Junction, N. J., for their yearly outing.

Coming from approximately 16 different towns in Northern New Jersey, including one from as far south as Burlington, the North Jersey Mineralogists found it impossible to make the entire journey as a complete body, from Paterson, so—a meeting place at the Sparta Service Center had been previously determined upon, from which point, the entire group was to proceed to the quarry.

Mineralogical Outing

It was only a small group of members, therefore, that met at the Paterson Museum, the home of the North Jersey Mineralogical Society, and these members were from Paterson and nearby localities.

The little group proceeded in three autos, toward Sparta, Sun. June 13, 1948, at about 9:15 a.m., under the leadership of George Hauze of Fair Lawn, who was responsible for arranging the outing and contacting C. Burnett Freas, superintendent of the quarry.

Appreciating the many beauties of Northern New Jersey's landscape, Mr. Hauze suggested that this little group leave the highway and travel to Sparta along roadways that led through many picturesque scenes. And thus it was done. Beautiful, especially, was the hemlock stand at Sparta and pretty were the many snow-ball plants that were seen as the cars neared Sparta Inn and its Antique Shop.

Arriving at 10:30, at the designated place in Sparta, near Pool's Eating Place and the Service Center, a welcome sight awaited the little group; for now, there were in all, 16 cars of North Jersey Mineralogists and their friends, anxiously waiting to make the final lap of the journey to the quarry. This day was to be one of prospecting and picnicking; a day long anticipated.

It was an enthusiastic people, that finally entered the quarry with prospectors' tools, hammers, chisels, and magnifying glasses, together with the never-to-be-forgotten lunches.

A Cheerful Welcome

Mr. Freas extended a cheerful welcome to the group and after many introductions and much conversation, pointed out the interesting parts of the quarry. But, before permitting the eager mineralogists to get their prospecting under way, Mr. Freas very graciously called the group together for picture-taking and requested, also, that each person present, have his name recorded in the corporation's roll book.

These two things accomplished the prospectors had the freedom of the quarry. Men and women alike, delved into the rocks to seek their luck. What minerals would they find?—Only hard work would give the final answer, and that, each one did with a will!

While searching for minerals, one was greatly impressed with the quarry's beauty and, as one member expressed herself, "It was as though I had been standing in an immense white castle, whose roof was the clear blue sky, and that I had only to reach heavenward, to grasp one of the pretty white clouds floating by."

Noteworthy Limestone Formation

The interesting formation of limestone in the quarry, likewise could not escape the attention of any true prospector. It is known as crystallized limestone and is composed of lime, with a percentage in some places, of magnesium. The magnesium limestone is called dolomitic. Of exceptional purity is the limestone in this quarry and the rhombohedral crystal cleavages are beautiful.

It has been said that limestone in this

interesting quarry, is used principally in agriculture, as a means of imparting lime to the soil's acidity.

The mineralogists had accomplished little during the forenoon, in the way of collecting minerals, but they had browsed around, here and there, locating rocks which might indicate the existence of certain types of minerals.

A big surprise awaited the mineralogists at lunch time, when they were invited by Mr. Freas, to partake of their meals, in a delightful little picnic grove owned by the company. This was a surprise, truly, for it had been understood that the grounds were restricted. Riding one quarter of a mile, the happy mineralogists arrived at the lovely picnic grove, with its swimming pool, slides, swings, and splendid shade trees, under which, were the picnic tables and benches. There, a grand feast was about to begin!

Good Eats

After spreading lunches of many varieties upon the tables, the lively members of the mineral family seated themselves. In friendly mood, they shared among each other, what extra food they had brought. Sociability ran high, as is customary among all North Jersey Mineralogists. And humorous moments were not lacking. Reminiscent of last year's field trip to Connecticut, and cognizant of the fact that frogs had created quite a good deal of interest there, Miss Florence Hight placed upon the table, two toy frogs, which surprisingly hopped about at unexpected moments. Shouts of laughter could be heard throughout the grove, as these funny little mechanical toys hopped back and forth.

After many pleasant moments of relaxation and picture-taking, the tables were tidied and once more the group returned to the quarry, refreshed from the noontime feast.

This was the most important part of the day, since each prospector worked zealously to find some interesting mineral specimens which he might exhibit to his friends.

The quarry is noted for more than 20 different varieties of minerals and the members expectantly went to look for them.

28 Minerals Discovered

As a result of their untiring efforts, the following minerals were found: calcite, hornblende, scapolite, spinel, sphene, pyrrhotite, biotite, ruby corundum, tremolite, fluorite, pyrite, chondrodite, norbergite, allanite, tourmaline, (dravite or magnesium tourmaline), red rhodonite or rhodochrosite, graphite, felsdspar, quartz, asbestos, serpentine, phlogopite, malacolite, vermiculite, actinolite, barite, and rutile.

These minerals were found in contact veins, where the igneous formations came in contact with the crystallized limestone.

Perhaps the most beautiful of all the mineral specimens found, were the spinel, some of which were at least one and one-half inches in size. Great excitement prevailed when Mr. Linares of Riverdale secured from the rocks, a beautiful black spinel crystal. To him is given the credit of having had the biggest find during the day.

David Dallery of Lincoln Park, working together with Mr. Linares, also found many splendid spinel specimens.

A fine specimen of blue fluorite was found by John Wiegand of Paterson. Lillian Kane of Paterson, claims to have in her possession, a fine specimen of tremolite. The nicest sample of sphene which came out of the quarry, was secured by Florence Hight of Paterson. To Hazel Terhune of Fair Lawn goes the honor of having obtained a fine specimen of dravite or magnesium tourmaline. It was also Miss Terhune who discovered the first signs of malacolite at the quarry,—but to Leonard Morgan of Burlington credit is given for having found one of the prettiest specimens of malacolite, which, by the way, he jokingly continued to call "American jade."

A very lovely specimen of actinolite was obtained by Thomas Mooney of Morristown. Paul Kellinghausen of Elizabeth, found a great many different varieties of minerals. To George Hauze, the members are indebted for having located

(Continued on page 829)

THE MICRO MOUNTER

Conducted by Leo N. Yedlin, 557 W. Penn St., Long Beach, N. Y.

The mail's been coming in and already there are "pros" and "cons" about a number of things. It was our expressed opinion that in m/m mineralogy the magnification should be very low for best results. While not entirely disagreeing, Mrs. W. Hersey Thomas, of Mt. Airy, Pa., states the following:

"I can not agree with you about using only low powers on the microscope. My eyepieces are 18x and my paired objectives are 2x, 4x, and 8x,—giving me magnifications of 36x, 72x and 144x. I have tried out the other powers and found by examining many speicmens that the above combination is the best. The 36x magnification is, of course, the one of greatest value but it is surprising how many times I swing one of the other lenses around to examine some tiny crystals in vugs or how often I discover some speck resolved into an exquisite crystal. Many of the tiny greenockite crystals are mere dots under the 36x magnification. I have some hewettite needles that are enhanced a hundred fold under the highest lens and I could give you many more examples. For magnifications less than 36x I prefer a Hastings triplet 14x or 20x".

That's the kind of mail we like.

Edward H. Leonard and Willis E. True of Portland, Maine, solved a problem during the war, when m/m boxes just weren't available. Flat cardboard cartons, 10" x 15" x 2" high were ruled with 1¼" squares, and photographic mounting corners (available at your stationer) were glued to the upper corners of the squares. The specimens were mounted on corks as usual, and then cemented to a 1" square of black cardboard. These slid right into the photo corners and were held in place by them. The specimens were numbered, and a corresponding list was fastened to the inside cover of the carton with all the pertinent data. Dustproof, compact and permitting of substitution and rearrangement, these were inexpensive and convenient.

From an old friend, now in Falls Church, Va., comes a letter and minerals. Byssolite, epidote, limonite after pyrite, from his home stamping grounds as well as a specimen of crystallized turquoise, from Lynch, Va. Phil Cosminsky is an ardent and discriminating collector. He likes visitors and exchanges.

You will recall in the July issue of *Rocks and Minerals* an article by Dr. Newcomet of Philadelphia, describing a method of mounting minerals for m/ms so that both sides of the specimen were available for viewing. The method was to rest the mineral on threads cemented to the m/m box. Then place threads over the specimen and fasten them to the sides of the box. Another idea is suggested. Fasten the SIDE of the mount to the cork, cement the cork to the SIDE of the box, cut open the bottom, and provide two covers. Top and bottom can then be viewed, and there is no doubt as to which side of a "double" is to be exposed. You have them both. Works fine. (See cut.)

We were fortunate in obtaining a couple of perfect cabinets for boxed specimens. These were not stock fixtures but happened to be available just when we needed them. They are 18 in. wide, 11 in. high and 12 in. deep. They contain twenty drawers in two tiers of ten, and the bottom of one drawer is one and a quarter inches from the inside surface of the one below it. The cabinets hold 1120 specimens each, and take practically no room at all. We have seen, too, at several office supply firms small metal cabinets of 6 drawers, with outside dimensions of 6 x 9 x 8½ inches. These hold from 168 to 216 m/ms, and sell for something less than five dollars. A battery of them is excellent. They're dustproof and fireproof.

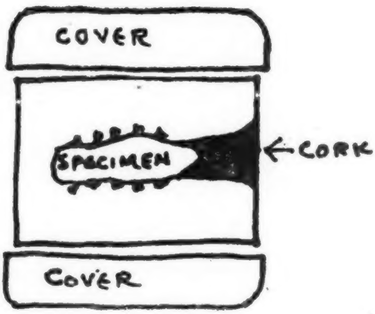
However, there is nothing wrong with the common cigar box, the flat one, hold-

ing twenty-five smokes. Paint it up, put a label on it, and you have a most convenient way of housing specimens. And if you get wooden ones the combination of tobacco fumes and cedar will act as a deterrent to most insects attacking the paper m/m boxes.

It is the fate of most collectors that they need a good microscope. Most state that they are saving specimens against the day when good instruments become available. We have a number of letters asking if we know of any such for sale. If any of our readers have a spare, or know of one, please advise us, so that it will reach a place where it will do the most good. There are several scientific instrument dealers in New York who have used binocular 'scopes from time to time. There are some who have new instruments for immediate delivery, including Ward's Natural Science Establishment in Rochester, N. Y. (Send for a catalogue.) But last month there came a letter of an entirely different character. The collector lives in a region almost barren of good mineral material. We quote from his missive:

"I read your article on micromounts in *Rocks and Minerals* with interest. I have a new Spencer stereoscope microscope with powers from 18 to 90, and a new Bausch and Lomb spherical lamp, but alas, I have only one micro specimen... I have been picking up small stones around the vacant places in Flatbush; some of these are interesting, but chiefly for the animalcules that live upon them..."

Surely a case of "man bites dog."



Method for mounting specimens to view both sides

Light brass shim to hold M/M Boxes

A M/M box holder for viewing specimens

World's Largest Star Sapphire

We are indebted to Miss Helen Kennedy, a R&MA member from Chicago, Ill., for the following notes:—

"Just thought you might be interested in knowing that the world's largest star gem was on exhibit during July at Marshall Field & Company, Chicago, 1st floor, jewelry section.

It was the "Black Star Sapphire of Queensland". Weight 733 carats. Value $300,000. Exhibits beautiful star caused by countless minute hollow tubes which follow the crystal habit of the gem and reflect the light, forming a star when cut cabochon.

"Along with the star sapphire, there were other smaller star sapphires. Also a simply beautiful chrysoberyl cat's eye (cymophane)—about 1" in diameter, I think, and worth thousands of dollars. Set in platinum with diamonds each side. High round cabochon. The cabochon looked a shimmery golden yellow color and the cat's eye line was straight down the middle in much lighter color. Gosh, it sure was beautiful. Am glad I had a chance to see what a chrysoberyl cat's eye looked like."

QUARTZ MINERALS

By GERTRUDE M. BRYANT
6 Quincy Street, Worcester 2, Mass.

Nearly everyone of us has been early introduced to this fascinating family of mineral formations. Our first acquaintance came when as children we picked up smooth, rounded beach pebbles, glistening in the sea water that played about them on the seashore. The cloudy white ones attracted our attention, although we did not know that they were milky quartz; the yellow ones, golden quartz or citrine; the mottled pink and grey pebbles, pink granite, which, of course, contains a good deal of quartz mixed with feldspar. If we found bits of stone with crystals in them, we were not so interested, for their roughness did not appeal to us at that early age. Nor were we thoughtful of the composition of the sand which yielded beneath our feet. It too contains many millions of quartz particles carried there by the waves, which chafe the rocky coast and tear away the boulders imperceptibly all the time.

This process of weathering, by which the heat of summer, the frosts of winter, the chemical elements in atmosphere, rain, and soil work to break down the structure of even the stoutest inland rocks, makes possible another interesting formation. The cracks thus formed in the rocks are filled with water containing soluble quartz. When this water is allowed to stand, dry, and solidify, it forms massive or crystalline quartz veins of a lighter color and glassy in texture. Such veins are everywhere to be found, not infrequently with toothlike crystals that suggest the jaws of some wild animal.

Sometimes soluble quartz forms incrustations on the surface of rocks, giving them a flashing brilliance when the sun strikes the crystal faces. This is known as drusy quartz.

Crystalline quartz may be recognized by the elongated, six-sided prism, terminating in a pyramidal point at one or sometimes at both ends. The more usual specimens are attached to a matrix, but occasionally doubly terminated ones like those known as "Herkimer diamonds", found in Herkimer County, New York, are discovered. The crystals may be very tiny, almost microscopic, as in drusy quartz; clustered, single, or twinned; they may also be very large. The largest I recall having seen of clear glassy quartz was a crystal approximately two inches in diameter and between 9 to 10 inches long, but undoubtedly the reader has seen others considerably larger.

I cannot leave the subject of the formation without mentioning what is perhaps the most amazing of all—the geode. This is a hollow rock ball, ranging in size from that of a golf ball to almost any conceivable size, usually however, about 8 to 10 inches in diameter, quite rough on the exterior. When the geode is broken, what a glorious array of glassy crystals may line the interior! They may be clear, milky, or smoky quartz, agate, even amethyst. The finder feels that he has truly discovered a treasure chest of beauty. No collector is satisfied until he has a goodly number of these fascinating specimens upon his shelves.

The uses of quartz are extensive: Rock crystal, when very clear, as the most perfect glass, is valuable for eyeglass lenses and other optical instruments and for jewelry. Since such crystals do not occur in large pieces in sufficient quantity for the optical trade, a method has been devised for the fusing of fragments of such quartz in an electrical furnace. This product is useful in making mirrors, lenses in telescopes and moving picture machines, electrical insulation, machines to transmit heat, light, and ultra-violet rays. With the use of the fused quartz rods, light rays may be made to bend around corners instead of penetrating the sides of the rod. Doctors are finding these rods of incalculable aid in diagnosis and surgery.

Quartz is also used naturally in the making of abrasives, building materials, paints, glue, small bearings for axles of fine machines, and for heat-resisting materials. It is very hard, number 7 in the scale of hardness, cannot be cut with

a knife, but must be cut by machine, although grinding may be done by hand. For radio oscillators, only clear and uncracked crystals may be used, for the cutting will elongate any crack and the crystals will become worthless.

The utilitarian point of view, however important, is not the one of most interest to the mineral collector. He is concerned with the beauty, variety, color, texture, and identification of the specimen at hand. He prefers to go into the field prospecting rather than to buy his specimens from a dealer, although he is quite willing to do so in order to have some of the rarer items from other localities. He would also prefer to swap specimens from his locality for those of some other region whenever possible. This brings worldwide friendships into being as the swapping becomes more and more extensive.

A really breath-taking collection can be built of stones belonging to this one mineral family alone, for among its members are several of the semi-precious gems: amethyst, onyx, agate, carnelian, bloodstone, jasper, rose-quartz, and citrine. Let us consider these separately for a moment.

Amethyst, with its beautiful violet to purple coloring, has been much prized as a gem stone since ancient times. The Romans believed that it was proof against intoxication, so they made their wine glasses from amethyst. This stone, now the February birthstone, is to be found in its finest form in Brazil, Uruguay, the Ural Mountains and Siberia. Heat applied to amethyst produces a rich golden brown color, making gems that may be often sold at a higher price as "topaz". "Scotch topaz" is really yellow quartz. A specimen of many grouped amethyst crystals is a truly valued one for any collector, and he is especially happy if he has a geode containing amethyst and agate in its interior.

Bloodstone, the March birthstone, is a dark-green massive quartz flecked with blood-red spots. Used to-day as a ring stone, in the Middle Ages it was prized for carvings of the martyrs. It is found in Persia, Siberia, and in our own Colorado.

Jasper—opaque, massive, in red, brown, yellow, or dark gray-green, sometimes banded—is used for ringstones as well as for larger decorative objects. In Russia, where it occurs in great quantity, it is widely used for vases, tables, mantels, and pillars. It is also mined in Egypt.

Citrine — yellow, glassy — known by jewelers as "Spanish topaz" or "False topaz", comes in gem quality from Brazil and Madagascar.

Lovely rose quartz—glassy, with a soft rose-pink color—is similar to rock crystal and amethyst in its appeal, whether cut into pendants for necklaces and ornaments, or standing in a place of honor among the other treasures on the shelf. One of the loveliest tomb-stones we have ever seen was a shapely boulder of bright rose quartz.

Chalcedony, appearing more familiarly as agate, onyx, sardonyx, and carnelian, has been the medium of engravers of all ages. Banded agate, with its ribbon-like stripings, lends itself to artificial coloring which adds to the beauty of its varying transparency. Moss agates, also artificially colored, may depict landscape or seascape pictures of great beauty. Carnelian and sardonyx make fine cameos and intaglios; banded onyx is expecially valued for the carving of cameos, since the one layer may be carved away around the edge of the design to form a framework of the darker band beneath.

Chrysoprase, a favorite gem of Queen Victoria, is an apple-green variety of chalcedony, very lovely as a ring gem.

A discussion of the quartz minerals would not be complete without mention of flint used by the Indians for weapons and for tools in pottery making; and of petrified wood, among the many varieties of this rich and diversified family. Flint, being very hard and massive, is useful in building a fire; it is translucent along thin edges, and could be cut to form a sharp cutting edge for knives and arrow heads, with which any student of American early days is familiar.

Petrified wood, in conclusion, is what is known as a pseudomorph, being not a true mineral, but wood transformed into

stone by the action of time and pressure. Thousands of years ago, forests standing in their prime beside an inland lake died out, the trees falling into the water and decomposing gradually. As the living cells died and lost their contents, the soluble quartz in the water seeped in, filling the cavities. Volcanic pressure, heat, transformed them through the ages into solid stone, retaining in many instances the exact formation of the cells of pith and bark, shape, size, and even appearance to some extent. The most famous areas of petrified wood are in Arizona and in Oregon where the formation is agate rather that the more usual quartz. Petrified wood is to be found, however, in many other localities.

From this brief study of quartz minerals, we can see what a bit of delving and interest can do to enhance our appreciation of the natural beauty which all too often lies unperceived all about us just waiting to be enjoyed by the alert seeker.

STEEL COMPANIES TAKING SAMPLES OF NORTHERN NEW YORK IRON ORE

Old Deposits, Abandoned Forty Years Ago, Are Now Examined To 2,500-Foot Depths as Mesabi Range Nears Exhaustion

WATERTOWN, N. Y., July 31 (AP)—The ore-hungry steel industry has started test drilling in northern New York State to determine if iron ore known to exist in the region is of marketable quantity and quality.

The latest of three concerns to show interest in the region is the Republic Steel Corporation of Cleveland. Contractors for Republic have set up three diamond drilling machines in the Caledonia iron mining area near Rossie, in northern Jefferson County.

The area was a principal sour-e of iron ore in the United States during much of the last century. The renewed interest in the region results from the possibility of an early exhaustion of the Mesabi ore which now supply the nation with most of its iron ore.

In addition to Republic, two other steel concerns are scouting northern New York for possible new sources of supply. Jones & Laughlin of Pittsburgh and Hanna Ore of Cleveland already have operations under way in southern St. Lawrence County. The Pittsburgh company is mining near Star Lake and Hanna in the town of Clare.

Claude Welcome of the Sprague & Hendwood Company of Scanton, Pa., is in charge of the exploratory drillings for Republic. He said samples would be taken from as far down as 2,500 feet. Drilling will be made at a 60-degree angle to obtain a cross-section sampling of the strata containing the non-magnetic hematite ore.

Mining operations in the area were suspended about forty years ago. The northern New York mines were superseded in importance by those of the Mesabi range in Minnesota because of cheap transportation through the Great Lakes.

—*(The New York Times)*
New York, N. Y., Sun. Aug. 1, 1948

Ads Are of Great Help!

Editor R&M:

I've taken *Rocks and Minerals* for nearly a year now and am very much pleased with it. The articles are always very interesting and the large assortment of ads are of great help to an amateur lapidary like myself. Keep up the fine work. It is the best magazine of its kind on the market and I shall renew my subscription when it comes due.

Charles S. Butler,
Waldoboro, Maine

Aug. 12, 1948

GEOLOGICAL OBSERVATIONS

Pool of Water Clue to Diabase Dike

In 1924 I was one of the engineers on the Bear Mountain Bridge road which began about 1 mile north of Peekskill, N. Y., and extended $3\frac{1}{4}$ miles in a northwesterly direction. The road was through virgin territory, almost entirely cut through rock, and for most of the way paralleled the main line of the New York Central Railroad (to the west), which in turn bordered the east bank of the Hudson River.

The main rock cut through was gneiss, with some granite, pegmatite, schist, and 5 dikes of diabase of which the largest was 40 feet thick. The road in a number of cases was perched on the edge of fairly steep cliffs, at the 40-foot diabase dike it was a 108-foot vertical drop, the deepest along its entire stretch. Between the road and the railroad there were a number of small ponds or large pools of water.

I was transitman for the engineering corps and at times would take bearings on the different rock formations, noted their trend, dip, thickness, etc., when it dawned on me one day that at the base of each cliff or near-cliff where a diabase dike should outcrop was a pool of water (no diabase outcropped anywhere except in the road cut). "Well," I said to myself, "if a geologist was to walk up the railroad track (averaging 400 feet away) he could tell how many diabase dikes were exposed in the road by counting the pools of water." A few days later I purposely walked up the track to test my belief, and to my amazement counted 6 pools of water, the first, the largest, over 300 feet long and which should indicate a dike of at least 75 feet in thickness. This large pool had no diabase exposed at all in the road cut nor anywhere else as I traversed the terrain for many hundreds of feet in all directions looking for it. Either my "theory" was wrong, or else the dike had been missed by the road. If the dike was present, where should it be? A careful study of the terrain indicated that the dike might be present in a fairly wide but small depression, the center of which was occupied by a good sized brook which came tumbling down a very rocky slope that was just strewn with large boulders, some weighing tons. Instead of cutting through this slope and brook, material had actually been thrown in. The case, therefore, seemed hopeless as only a steam shovel could make any impression in that heavy deposit of large boulders.

I kept thinking and thinking about the problem. I had a firm conviction of being right but how to prove it? Finally I could stand it no longer and one noon hour (lunch period) found me digging away, with pick and shovel, at the very edge of the road and close to the brook. I dug down about 2 feet when, "I found it!" The diabase dike was there and my "theory" was right. I made no effort to expose the entire width of the dike (just about 3 feet) as that would have been some job'

Peter Zodac

A New Method of "Silver Pick" Mining

Often good specimens may be purchased cheaply in the small antique shops throughout the country. Many fine old collections, after reclining for years in dusty attics, have found their way to antique dealers. The price for such material is usually quite low. However, specimens should be examined, and the locality ascertained (if possible) should the label be missing.

The writer has added many choice items to his collection in this way, including minerals unobtainable elsewhere.

Dan Barker,
N. Whitefield, Me.

QUESTIONS and ANSWERS

Rocks and Minerals is receiving so many questions, many of common interest, that we are reviving the Questions and Answers Department which used to run in the magazine. The following are some questions recently received:

Ques. "In glancing over some 1934 copies of "R&M" I noticed that the Association was very active (outings, school clubs, etc.) What has happened? How come no activity now? I would like a little action on this subject.——D. B., N. Whitefield, Me.

Ans. In 1934 we were not so swamped with work as at present and, therefore, had more time to give to the activities of the Association. In those days, also, we had the cooperation of Fred W. Schmeltz, the most active field director we ever heard of. It was Mr. Schmeltz who was the guiding spirit and the power behind those famous outings of years gone by and when we lost his support, outings and field trips just ceased to be. Mr. Schmeltz is still with us—he will never give up *Rocks and Minerals*—but unfortunately for the Association his work has him so tied down that he cannot give us his support any more, at least not for some time to come. Now that the magazine has become a bi-monthly, we may get caught up with work and have time to give to the activities of the Association—perhaps in 1949 we may revive the outings again.

Ques. "I recently saw an Estwing mineral hammer for the first time and I want to get one. Where in Boston can I buy one?"——A. M., Boston, Mass.

Ans. The nearest dealer we know of who handles Estwing hammers is Schortmann's Minerals, 10 McKinley Ave., Easthampton, Mass.

Ques. "What is America's most popular mineral?"——R. D., Buffalo, N. Y.

Ans. This may be a matter of opinion but judging from dealers' ads, we would say it is the agate.

Ques. "What is a good mineral to specialize in?"——A. C., Chicago, Ill.

Ans. Quartz.

Ques. "I am going to spend the winter in Florida. Are any minerals to be found in that state?"——A. A. M., Watertown, N. Y.

Ans. An area near Tampa, Fla., is world-famous for its geodes. Send 35c to *Rocks and Minerals* for a copy of the Dec. 1941, issue which contains a 20-page article on the area, "Collecting semi-precious stones in Florida", by James G. Manchester.

Ques. "I am sending you a specimen of tourmaline which I collected on a recent trip. Is it a collector's item and if so how much should I charge for it? I have about 50 lbs."——J. T. E., Hartford, Conn.

Ans. The specimen is of poor quality and not a collector's item. We would suggest that you buy two or three specimens, of different colors and especially black and green, and thus get an idea what a good specimen really looks like and what it sells for. Any of the nearby dealers in Massachusetts, New York, New Jersey, etc., carry fine specimens of tourmalines.

Ques. "I never buy specimens from dealers as I think it is more fun to collect them personally. What do you think?"——H. H. N., St. Louis, Mo.

Ans. Collecting minerals personally is lots of fun. It is educational in more ways then one, it is healthful (unless you overdo it), and it makes life really worth living. But if you want to have a really good collection, one that will attract much attention and most favorable comment, and will place you in the "Whose who in mineral collecting", then you will have to buy your specimens. Once in a blue moon a collector is very very lucky. His work carries him all over the United States, all over the world in fact, he has many opportunities to collect in every country and when he visits a locality he has the Midas touch—everything he touches turns out to be a very fine specimen. Such a collector does not need to buy specimens.

Ques. "Where can I see a copy of the Special Agate Number (of Rocks and Minerals) since I cannot buy it?"——A. D. R., Detroit, Mich.

Ans. This number (Sept.-Oct. 1936) is exhausted but you can see a copy at the Cranbrook Institute of Science, Bloomfield Hills, Mich.

Ques. "I recently obtained some nice native copper from Michigan. New Mexico and Arizona. Are any to be found in the east? I am a new collector, hence my ignorance."——F. R. G., New York, N. Y.

Ans. Yes, many localities in the east furnish native copper, perhaps the one most noted is the old abandoned Bigham copper mine in Adams County, Penn. Just to name a few others are the old abandoned copper mines at

Arlington, New Brunswick, and Somerville, and the zinc mines at Franklin, all in New Jersey; Virgilina, Va., copper mine; Gillis (Everett) copper mine near Proctor, N. C.; and the famous copper mines at Ducktown, Tenn.

Ques. "Is all hyalite fluorescent?"——M. M. N., Denver, Colo.

Ans. No.

Ques. "Are the zinc mines at Franklin, N. J., still in operation and if so can I get permission to visit the dumps?"——S. E. G., Nashville, Tenn.

Ans. The mines are still in operation but permission to collect on the dumps is never given collectors, except in *unusual* cases.

GLACIAL DEPOSIT NEAR WHITE HAVEN, CARBON CO., PENNSYLVANIA

By MISS CAROL VAN WAGENEN

3 Dale Avenue, Ossining, N. Y.

While on a two weeks vacation in eastern Pennsylvania, I made a trip to Big Stone Field, a glacial deposit in Hickory Run State Park near White Haven, Carbon Co., Pennsylvania.

The field is made up of large boulders and is approximately one and a half miles in length. I give this as the approximate distance as the day was very foggy and the entire field could not be seen.

The stones have a hollow sound when walked over as if walking over a vault, giving the impression that what is now the deposit was once a valley that has been filled with boulders by a glacier.

Upon observation, the stones appear to be of a sandstone variety although some conglomerate was found. The specimens here are not of mineralogical value, but are of interest only as a representative of this unusual geological formation.

Fossils at Downsville, N. Y.

A dam is under construction near Downsville, in Delaware County, N. Y. It will impound the waters of the East Branch of the Delaware River in order to furnish an additional supply of water to New York City.

During construction much rock has been excavated. The bedrock of the region is the Catskill series of sandstones and shales, of Devonian age. It contains an abundant fossil flora, plants and twigs, most of which are preserved in the form of anthracite coal.

In addition to the fossils, small amounts of pyrite, galena, and quartz crystals have been found. The minerals occur as joint fillings in the sandstone, and are of supergene origin.

Thomas W. Fluhr.

August 12, 1948

Collector's Kinks

FOR DARK CABINETS use Slick Silver, Gold or Red Foil Wrapping Papers on the sides, back and under your specimens, and use texcel tape to hold in place. This will reflect light and make a setting for your specimens.

IT'S FUN TO MAKE HOLDERS FOR AGATE SLICES OR SPECIMENS out of Plastic Clay that dries hard after being exposed to the air for a few days. After it is dry, paint or gilt it any color. Be sure to allow 1/16" for shrinking in the groove where you will place your specimen. Also while the clay is wet you can embed tiny bright pebbles or shells which can be done over with clear shellac or etc.

MVN.

COLLECTOR'S COLUMN

Conducted by A. CAL LECTOR

One of the most fascinating hobbies is mineral collecting, and it has many devotees all over the world and especially in the United States. Mineral collecting may take a long time to digest but once it gets into your blood it is there to stay forever.

Every year more and more collectors spring up throughout the country, many of whom are young boys and girls. Unless these new collectors may have a friend who is an advanced collector to guide them, they may flounder around haplessly for many months before they in turn become experienced. To assist beginners and to guide them, this column will make its regular appearance, beginning with this issue.

Every collector should have a collection of well labeled minerals and these should be the best he can afford. There are about 2,000 different minerals known—from all over the world—but as many of them occur in different colors, varieties, or forms, a collection could number 10,000, 25,000, 50,000 or even more specimens. The average collector has about 1,000 specimens, size approximately 2 x 3 inches each, but these are all of good quality, fully labeled, come from all over the world, and are attractively displayed.

How to Begin

The first thing a beginner should do is to get himself a small collection of at least 50 specimens of the most common minerals and about 18 specimens of the most common rocks. The minerals should include albite, amphibole (hornblende), arsenopyrite, azurite, barite, beryl, biotite, calcite (cleavage, crystal, stalactite), celestite, chalcopyrite, chromite, chrysocolla, cinnabar, copper (native), corundum, dolomite, epidote, fluorite, galena, garnet (almandite), graphite, gypsum (massive and selenite crystal), halite, hematite, kaolin, lepidolite, limonite (massive and pseudomorph pyrite crystal), magnetite, malachite, microcline, molybdenite, muscovite, opal, orpiment, phlogopite, prehnite, pyrite (cube and massive), pyrrhotite, quartz (agate, amethyst, chalcedony, jasper, milky, petrified wood, rock crystal, rose, smoky), realgar, serpentine, siderite, sphalerite, stibnite, sulphur, talc, tourmaline.

The rocks should include basalt, clay (brick), conglomerate (quartz), diabase, gneiss, granite, limestone, marble (coarse crystalline and fine crystalline), obsidian, pegmatite, quartzite, sand (beach), sandstone, schist (mica), shale, and slate.

These specimens are available from many of our advertisers at prices as low as 15c or 25c each. The specimens should be your study collection and around it you should build a larger and better one.

Books Are Important

Along with the study collection you should have, also, one or two good books suitable for beginners. The following are recommended:

Dana—Minerals and how to study them.

English—Getting acquainted with minerals.

Hawkins—The book of minerals.

Zodac—How to collect minerals.

The books can all be obtained from dealers.

Diaries Are Very Important

When your specimens arrive from a dealer, note these points: each specimen is well wrapped and each is accompanied by a label giving name of specimen and its locality, note also the size of each specimen and its price.

After you get your specimens unpacked and each one laid on its label, you should record them in notebooks, one notebook for the minerals and another for rocks. These notebooks are called diaries. Give each specimen a number, 1 albite, 2 amphibole (hornblende), 3 arsenopyrite, etc. The same for rocks, 1 basalt, 2 clay, 3

conglomerate, etc.

Get some small gum labels, just big enough on which you can write the figures 1, 2, 3, 4, etc., one on each (in ink). Attach a label to some inconspicuous part of each specimen (they may not stick very well so cover each with Scotch tape, which is transparent). On a corner of each label, mark its mineral number. The purpose of these numbers is to identify the specimens should their labels become mixed or lost, Thus if you should pick up a specimen whose label is missing and its number is 3, on looking up this number in the diary the mineral is arsenopyrite; an arsenopyrite label may then be found and it, too, should carry number 3, because later on you might have two or more arsenopyrites, and each from a different locality and each should have a different number.

In addition to the name of each specimen, jot down in the diary its locality, size, price, from whom purchased, date of its arrival, etc. These headings may be noted at the top of each page and the columns ruled.

For rock specimens, we would suggest that you add "r" to each number to designate that it is a rock specimen.

CABINETS

The next step is to house your collection in a cabinet or large flat boxes, so that the specimens may be grouped together, covered to eliminate dust, and at the same time be easily seen and examined. If you can get a cabinet with shallow drawers, it is the ideal equipment. It is advisable to have a small cardboard tray for each specimen and its label. These trays prevent specimens from rolling around and rubbing against each other which might damage them; they also prevent specimens from getting lost from their labels. If a specimen is a fragile one or very soft, it is always best to pick up the tray with its specimen rather than to pick the specimen up itself. These trays are obtainable from many dealers but they can be easily made at home for the beginner's collection. For home-made trays, cut a section (about one inch deep) from near the bottom of any clean, empty, cardboard container you may find in the kitchen. That's all there is to it. Each tray should be just large enough to hold a label and its specimen.

NORTH JERSEY MINERALOGISTS OUTING

(Continued from page 819)

specimens of ruby corundum.

William C. Casperson, curator of the museum, and president of the society, found during his prospecting, an excellent sample of graphic granite and also a large specimen of graphite, which he will place on display in the museum.

Happy Ending

As the day finally drew to a close, one car after another gradually left the quarry. But a small group of mineralogists, lingering on, chatted contentedly over the happy events of the day. Food that remained in the lunch boxes, was also distributed to those who were hungry, while bottles of Root Beer satisfied those who were thirsty.

In a high glee, the mineralogists at last parted, fully determined that the North Jersey Mineralogical Society ought to hold several such outings as this one, during the year.

—(Reprinted from *The Call,* Paterson, N. J., June 15, 1948.)

San Dieo County Fair Gem and Mineral Exhibit

The gem and mineral exhibit at the San Diego County Fair (June 25-July 5) proved to be an outstanding feature of the show, attracting ninety thousand visitors. Over $1400 in premiums were distributed. San Diego County's prominent position as a producer of gemstones in California was featured in many of the exhibits, George Ashley, of Pala, placed first in the San Diego County gem and gem minerals section. A popular part of the exhibit was the lapidary equipment section, which operated throughout the show. An added attraction was the display of $20,000 worth of gold nuggets and lode specimens through the cooperation of the State Division of Mines and Fair Officials.

—California Division of Mines Mineral Information Service Aug. 1, 1948.

CLUB AND SOCIETY NOTES

ATTENTION SECRETARIES—If you want your reports to appear in the Nov. issue, they must reach us by Oct. 10th—the Editor.

K. M. M. Club

Interested parents, have taken rides this summer that they never took before. Instead of beach resorts, fishing lakes, and other leisurely destinations, they found themselves at the bottom of torrid quarries, or scrambling along stream beds, or yet utterly lost ten miles from nowhere in search of their own chosen golden fleece.

And they love it! In early spring, one member of our club persuaded a sympathetic father to take him down to Topsham, Maine not far from here, where feldspar quarries honeycomb the countryside. In Bowdoinham they paused, attracted by a small dump beside the road and some distance from a quarry. They all got out and looked it over. Suddenly a scream from young Bill brought everyone on the run, sure that the least horrible thing which had happened had been his falling into an unsuspected pit. They found him stabbing desperately with chisel and hammer at a piece of white quartz which partly enclosed a gemmy beryl crystal, (aquamarine) three inches long and about a half-inch thick. It is a lovely cabinet specimen, and of course a lucky and unusual find. We all agreed upon seeing it that it is one of those things that happen every 100 years, and turned an envious shade of green to match.

This had a most promising effect upon Bill's father, who promptly became enthusiastic. A short time ago the family took a trip to a tourmaline mine in Paris, Maine, and came home loaded down with specimens.

The summer has separated us to some extent but before school closed we took several hikes out into West Gardiner, where the red jasper lurks in unexpected places. Pebbles can be picked up from time to time—dark red with bright red flecks, and sometimes bright red with flecks of dark red. The largest pebble I ever found was probably an inch and a half by ¾ inch. Not a collector's dream, but pretty enough and frequent enough to keep the chase exciting. On the banks of the Sandy River near Farmington an acquaintance picked up a nice piece of bloodstone recently.

My boys have a rich field to roam. Maine is a jewel box. While it will be unusual if any find proves to be valuable, it is possible for them to acquire an impressively large collection without once stepping out of the state. Tourmalines from Paris and Newry, amethysts from Stowe, beryls and topaz from Topsham, zircons from Litchfield—lepidolite, hematite, magnetite, staurolite, silver, opal—hosts of minerals, including the well-known but hard-to-find cancrinite, which, though of no commercial value, is an interesting item and can be found in nephelite in the vicinity of Litchfield.

Last year the boys in the KMMC were in the sixth grade, which I teach, and therefore in my clutches. When school opens they will be harder to round up for club meetings. But I figure that after a year of interesting study and hikes, together with the starting collection they all have made, they will keep it up. I, myself, have done nothing more than expose them to the field, and we have shared all information and discoveries as we went along. But I am convinced that out of ten boys one or two will make it a life hobby, and that some day *Rocks and Minerals* will be receiving articles from at least one noted mineralogist who began his study of minerals in Gardiner, Maine.

And I, in my retreat at the bottom of some abandoned quarry, will read it and bask in reflected glory!

Constance P. Trott
36 Mt. Vernon St.
Gardiner, Maine

Cleveland Lapidary Society

The Cleveland Lapidary Society had its regular monthly meeting on July 6, 1948, at 7:30 p.m. The place of meeting was changed from the Arcade in downtown Cleveland to the Mineralogical Building at Case Institute of Technology.

The new location is ideal for a club of our kind and no doubt will be an attractive feature to prospective members.

Twenty members and visitors were present at our July meeting.

The subject of the meeting consisted of a question and answer period which proved very interesting. Mr. Charles K. Worthen, Michigan Lapidary Company, was present and gave us a very interesting account of his part in the Denver Meeting. Our member "Bud" Boehm of Warren, Ohio, was also at the Denver convention and he gave a very fine account of his trip.

The Cleveland Lapidary Society wishes to invite all interested persons to our regular meetings which are held on the 1st Tuesday evening of each month 7:30 p.m. at Case Institute of Technology, Cleveland, Ohio.

John M. Heffelfinger
Secretary,
7619 Redell Ave.
Cleveland, Ohio

North Country Mineralogical Club

Paul Zimmer, geologist of the Republic Steel Corporation at Lyon Mountain, N. Y., was the principal speaker at the June meeting of the North Country Mineralogical Club. Mr. Zimmer has made an intensive study of the geology of the Adirondacks in connection with his work. He recently received his master's degree from the University of Washington, with a major in that field. In his talk, he first sketched briefly the geologic history of the Adirondack region, and the story of mining operations at Lyon Mountain. Then in more detail, he described the types of minerals found in the locality, particularly those discovered during extensive exploratory mining on the Republic Steel Corporation holdings. He discussed the rock formations found there, illustrating his points with geological drawings. He had on exhibit about 50 specimens, including some unusual crystal structures. He was most generous in answering the many questions of the group, following his talk. Also on the program of the June meeting was a talk on pearls, the June birthstone, by Robert Iverson.

The program for the July meeting included a description by Miss Lillian Allen of a mineral collection which she had seen recently, and which the club is planning to purchase as a permanent mineral exhibit. It will be kept in the Plattsburgh Public Library. Miss Allen also showed specimens of gem minerals which came from a large gem collection she had seen in Norristown, Pennsylvania. Robert Rex, a member of the Club who is a student at Harvard University, exhibited and answered questions about a large number of mineral specimens which he had collected during a three years' stay in Costa Rica. A visitor, Lester Clutterbuck, member of the North Jersey Mineralogical Society, told about the activities of his club and discussed the famous fluorescent minerals of Franklin, New Jersey.

Three field trips were held during June and July. On Sunday, June 27th, Dr. John H. Rusterholtz of the Plattsburgh State Teachers College science department conducted the club through Ausable Chasm. On the trip through this famous gorge, Dr. Rusterholtz explained its geological history and the rock formations. The expedition concluded with the boat ride through the rapids and the Flume of the Au Sable River.

On Sunday, July 11th, a class in Regional Science of the Plattsburgh State Teachers College summer session joined us for a trip to the Vermont Marble Company plant at Proctor, Vermont. The trip included a picnic lunch en route, at the Crown Point State Park. At Proctor, the group witnessed a technicolor film, "The Cavalcade of Marble", which portrayed the quarrying activities of the company and the buildings throughout the country constructed of their marble. Following the showing of this motion picture, guides conducted a tour of the marble exhibit. This includes varieties of marble from all over the world, of many different colors and finishes. Later, Roland Ellsbury, brother of our Club president, led the group through the company's shops, showing the types of cutting and polishing equipment. We were able to secure specimens of both polished and unpolished marble of several varieties.

The Cascade Lakes, near Lake Placid, New York, were the objective for a field trip on July 25th. Here we found examples of blue calcite, green diopside, and labradorite (the iridescent variety). On the return trip, the Club stopped at Ausable Forks to visit the monument works of Fred Carnes, a member. Mr. Carnes demonstrated stone cutting and polishing machinery. He also distributed samples of granites from Alaska, Canada, and Massachusetts.

Gertrude E. Cone, Secretary
Keeseville, N. Y.

Mineralogical Society of Southern Nevada

Mr. A. E. Place, Boulder City Mining Engineer, spoke on soluable minerals deposits in the dry lakes of the southwest at the July lecture meeting of the Society. His discussion embraced Searles, Kramer, Dale and Bristol Lakes. Specimens of the Searles Lakes minerals were shown supporting the talk. The annual picnic of the Society was held the first week in August to Mt. Charleston, Nevada. Guest of the Society on the trip was Mrs. Victoria Vogel of Cochella Valley Mineral Society.

A display of fluorescent minerals, "Atoms in Action", is currently being sponsored by the Society, in local store windows. This is part of the plan of the group in advertising the mineralights which they are giving away to raise funds to support the educational projects of the Society. For a donation to the club of one dollar, your name goes into a pot, with the opportunity of receiving one of the seven lamps being given away. Names will be selected on September 7th, and winners will be announced in *Desert Magazine, Rocks and Minerals* and *Mineral Notes and News*. The Society was represented at the California Federation Convention, and since the Clark County Gem Collectors Club was rejected from membership in the Federation, The Mineralogical Society of Southern Nevada, Inc., remains the only Southern Nevada Society represented.

Visitors are always welcome to stop in Boulder City as guests of the Society. While it is too warm to make field trips, there is ample material available at the Society's headquarters. Stop and swap a mineral or two.

D. McMillan
Publicity Chairman
Box 23
Boulder City, Nev.

Cincinnati Mineral Society

A regular monthly meeting of the Society was held 8:00 p.m. Wednesday, July 28th, 1948, at the Cincinnati Museum of Natural History, Cincinnati, Ohio. A fine turnout of about 20 members and 3 guests braved the Cincinnati heat to prove that real rockhounds will go thru anything to engage in rockhound activities.

Two guests, Messrs. Weibel and Payne, were introduced and they soon felt right at home in our midst. Mr. Payne, a printer, offered to print personalized mineral labels for members in exchange for mineral specimens. We were happy to have with us again Mr. G. F. Hubing.

Mrs. Ralph Clark was accepted as a member of the Society swelling our ranks to 22 members.

Miss Rose Ann Dehoney announced Saturday, August 7th, as the date of her marriage to Mr. James Fox. Invitations to attend were extended to all members.

Mr. Sarles just returned from a 2 weeks visit to New York State and Washington, D. C. He reported having spent some time hobnobbing with top men of the U. S. Geological Survey and the National Museum in Washington. Mr. Sarles was also a guest at a meeting of the District of Columbia Mineral Society. We wish to thank these people for the courtesies extended to Mr. Sarles.

Mr. Sarles always has something up his sleeve. Tonight he presented a grab bag to the members. At least 15 widely different minerals, some very nice, were represented in the wrapped specimens which members picked from the bag. Your correspondent got a fine piece of Cobaltite.

Mr. James Clements introduced our speaker for the evening, Mr. Frank Atkins, Jr. Mr. Atkins' subject for the evening was "The ore deposits of Sudbury, Ontario, Canada". Following is the gist of Mr. Atkins' excellent authoritative talk.

The Sudbury district today produces 90% of the world's nickel. The smelting operations are of such extent that due to sulphurous fumes of smelting, there is a complete lack of vegetation for a radius of about 30 miles.

The region was discovered in 1856 when the Canadian National Railroad was making cuts for roadbeds. The abundance of sulphides aroused the interest of mining groups who upon close examination found them to be chiefly copper sulphides. Later in 1888 the high nickel content was found and as a result the work of development of the nickel ores was carried on by the Canadian International Nickel Co., who saw the possibilities of nickel in alloying steel. Early experiments by the Krupp plant in Germany proved the value of nickel in steel, and as a result early production of nickel went chiefly to Germany. Canadian International Nickel then promoted and developed uses of nickel steel in the U. S. and now is their chief market. It is interesting to note that the tonnage of copper produced has always exceeded nickel; a minor quantity of platinum is also produced.

Briefly the structure of the region and its origin is as follows: The basic rocks are intrusive igneous rocks, the basins of which were filled by early sedimentation then later intrusive igneous action enclosed portions of the sediment.

The region of the ore deposit is a large synclinal basin or spoon-shaped sill about 35 miles long and 16 miles wide. The sediments are of Cambrian and pre-Cambrian age and are enclosed by norite, granodiorite grading into micropegmatite rocks. The contact area is the richest part of the ore body. The richness of the ore is uniform due to the compactness of the deposit. There is relatively no surface oxidation, no low quality ore at top and secondary enrichment at the bottom due to circulating action of water as is sometimes found in ore bodies. The ores are all massive with practically no crystallization. The area is not a good collecting one for crystallized specimens but is excellent if one is interested in variety of ores and structural features. At present the Copper Cliff mine is the leading nickel producer in the area.

Chief ores at the locality are as follows: Pentlandite (sulphide of iron and nickel—39% nickel), Pyrrhotite ([niccoliferous] sulphide of iron and nickel), Chalcopyrite ([niccoliferous] sulphide of iron and copper), Pyrite (iron disulphide with nickel and copper in small quantities), Arsenopyrite ([niccoliferous] sulph-arsenide of iron), and Sperrylite (platinum arsenide—.24% platinum).

Mr. Atkins' talk was followed by a question and answer period which rounded out a very fine meeting.

Charles L. Gschwind,
6931 Diana Drive,
Cincinnati 24, Ohio

Pomona Valley Mineral Club

The Pomona Valley Mineral Club held its annual picnic July 11 at Fairmount Park in Riverside, Calif. A hearty luncheon was followed by a short meeting during which various members told of their vacation. Pauline Saylor spoke on Yellowstone Park and the surrounding territory; Larry Boileau described a short trip to Grand Canyon: David Grover discussed Salton Sea; and Glenn Weist mentioned his trip to the Grand Canyon, Canyon Diablo, and the Sunset Crater. After the meeting, some of the members went to a nearby quarry where blue and green calcite was found, as well as garnet crystals and minute tourmaline crystals.

Verna N. Weist
Publicity Chairman
322 A East B St.,
Ontario, Calif.

Georgia Mineral Society
(Atlanta, Georgia)

On Sunday 25 July, 1948, the Georgia Mineral Society and its guest, the Georgia Chapter of the Appalachian Trail Club, panned for gold in the famous Dahlonega gold mining district of North Georgia. Some sixty to seventy people were present and all were embryo Forty-Niners who tried their luck with pan after pan of the gold bearing material, quite a few came up with a nice show of color after they got the hang of the technique of panning.

Gold was first discovered in this district in 1829, and by 1838 the production had become sufficient to warrant the opening of a branch of the United States mint at Dahlonega. This mint was operated until 1861 when Georgia seceded from the Union. Mining has been more or less spasmodic since that time.

Our thanks go to Capt. Garland Peyton, Pres. Elect of the Society, for leading a most interesting and successful trip to a happy conclusion. It is the opinion of the writer that a very small percent if any of those present will take to panning as a means of livelihood in the near future. Be that as it may the old saying is still good "Thar's gold in them thar hills", and it still remains for someone to discover a better and cheaper method for extracting it.

S. C. Knox
Corresponding Secretary
2142 Memorial Dr., SE
Atlanta, Ga.

Southwest Mineralogists

The Southwest Mineralogists Inc. were fortunate in having Mr. Gene Allen as speaker at their August 9th meeting. Mr. Allen gave a talk on the history of sawing, bringing to light the fact that saws originated with the Chinese, using wire drawn back and forth across a slab to literally wear it through. After being taken through the various developments of the saw we were extremely interested in a demonstration of the latest equipment. How grateful we Rock-hounds should be for our modern lapidary equipment. The meeting came to a close after having pie and coffee and, an interesting discussion by members on sawing methods.

We will be happy to welcome any and all, interested in minerals, crystals and stone polishing at our new address 471 W. 41st Place, Los Angeles, Calif. Meetings are held the second Monday of each month except when the first Monday is a holiday, then we meet the third Monday at 7:30 p.m.

Connie Trombatore,
Corres. Sec'y
338 Pomelo Ave.
Monterey Park, Calif.
AT-lantic 1-9949

Pacific Mineral Society
Arciniega Outlines Geology of Darwin District

The July meeting of the Pacific Mineral Society was met with an unusually large attendance of members to hear Mr. Victor Arciniega outline the Geology of the Darwin District, Calif., in view of a field trip to this area in the near future. Besides being the first President of the Pacific Mineral Society, Mr. Arciniega teaches adult classes of Mineralogy, Geology, Chemistry, and Optics at Manual Arts High School in Los Angeles, Calif., and has won many friends in the Southland.

The Darwin district consists of a group of small hills within the Darwin Plateau, and is bounded on the east by Panimint Valley. A chain of mountains starting with the White Mountains extends down from northwest to the southeast and includes the Inyo Mountains, Coso Mountains and the Argos Mountains. The rocks in the Darwin area are faulty and greatly folded with the folds ertending in a northwest and southeast direction. The folds do not extend more than six miles in length from north to south or three miles wide from east to west. They consist of a schist of quartzite and shales of Middle Mesozoic time and then were intruded by granitic rocks. Much of the hills are covered with limestone and the white or greenish limestone indicates the areas of mineralization which has been deposited by contact metamorphism. According to Mr. Arciniega, the Defiance mine is a good example of the contact metamorphism in this area. These limestones were intruded by granitic rocks which in turn faulted, leaving fissures which were filled with various minerals that came up from different depths at different pressures. The main mineral found here is argentiferous galena. Other minerals that are also found here are Anglesite, Cerrusite, Silver, and the gangue minerals consisting of Pyrite, Quartz, Jasper, Hematite, and Fluorite. Scheelite is also found in this area and is on the margin between the gangue minerals and the Silicates. The fractures in this area are a result of faulting before mineralization or intrusion, after intrusion, and just before minerals formed and the largest of these fractures is called the tear drop fault. Mineralization is close to contact of igneous rocks, bedding planes, and cross fractures or fissures. Grossularite and Andradite garnets up to three inches across have been found in this area. Fossils have also been found in the Darwin District in the gray and bluish limestones but not within the mineralized area.

Mrs. A. E. Allard, Pub. Chmn.
3133 Live Oak St.,
Huntington Park, Calif.

Newark Lapidary Society

The Newark Lapidary Society, Newark, New Jersey, is being formed to encourage and stimulate interest in cutting and polishing gem material. Meetings will be started this Fall and anyone, interested in receiving notices should communicate with Louis Andl, President, 107 Melville Place, Irvington 11, New Jersey. Please state whether you have done any cutting and whether you already own lapidary equipment.

Los Angeles Lapidary Society

The sixth gem show of the Los Angeles Lapidary Society held by invitation at the California Federation Convention in Long Beach was a huge success. So many people, so much material and equipment under one roof can hardly be imagined.

The L.A.L.S. had as guest speaker at the August meeting Mr. Myor Wolfenson of Myco Casting who talked on "The Lost Wax Process of Casting".

This year will see the L.A.L.S. launch a better public relations program by a series of exchange visits with other Gem and Mineral societies.

J. E. Gaston,
Corresponding Sec'y
3776 Dover Place
Los Angeles 26, Calif.

Columbian Geological Society

An interesting field trip was enjoyed by 34 members of the Columbian Geological Society of Spokane, Washington, on August 8, 1948. The trip included a visit to the Cleveland lead-silver mine and agate beds north of the city.

C. J. Hubbard, V. P.
2604 W. Dalton Ave.
Spokane, Wash.

Texas Mineral Society

The Texas Mineral Society held its regular monthly meeting August 10th, 1948, at the Baker Hotel in Dallas.

The American Airlines graciously showed the Society some color sound movies of "Viking-Land" and "Mexico". These were some of the best movies which have ever been exhibited to this Club. Other Societies would do well to contact the American Airlines and see if these films could be shown at their meetings.

The Society plans a banquet at the Baker Hotel next meeting night which will be September 14th.

Ralph D. Churchill
Sec-Tres.
2003 Republic Bank Bldg.
Dallas 1, Texas

Newark Mineralogical Society

The Newark Mineralogical Society held an outing on July 10th, 1948 to the Tilly Foster Iron Mine, Brewster, N. Y.

The weather was perfect and twenty-nine members gathered in front of the Newark Museum at 8 a.m., and in no time the caravan of cars was off, lead by our President W. H. Hayes who knew every turn and corner in all the traffic from New York City to Brewster.

List of minerals found is:

Biotite, Chondrodite, Clinochlore, Enstatite, Fluorite, Molybdenite, Magnetite, Pyrrhotite, Pyroxene, Serpentine, Graphite and Quartz.

Herman E. Grote,
Publicity Committee
95 Lenox St.,
Newark 6, N. J.

Note on "Diamond Ledge" in West Stafford, Conn.

Editor R&M:

In the July issue of *Rocks and Minerals* I noted your article regarding the occurrence of quartz crystals at "Diamond Ledge" in West Stafford, Conn. I was particularly interested because I have been there and collected specimens that proved to have a lot of mineralogical interest.

You might like to know several things about the before mentioned occurrence that were not included in your article as they were observed by me after my trip to the location, as they may add to your enjoyment of possession of the crystals.

Take first the fact that most of the quartz there is stained with limonite: this can all be taken off from the specimens without injuring them at all by boiling them in oxalic acid, being careful, of course, not to shock them by sudden changes in temperature. They will come out of the acid a nice milky white.

After cleaning the crystal groups, if you will look over the bases of the crystals where they are separated from the matrix, you will see that in a great many of them there is in the center the indications of a clear quartz phantom, and it is a fact that there are phantoms in them. I have one crystal that is split lengthwise, and in the center of it there is a clear terminated phantom that indicates that the outer milky crystal is a secondary or later growth. I have also found separate clear loose crystals, and some on matrix that lie flat on each other in a disordered arrangement. One more type is that of clear crystals coated with microscopical drusy crystals which gives them a matted surface appearance.

W. H. Hayes
35 - 22nd St.
Aug. 5, 1948 Irvington 11, N. J.